HITACHI

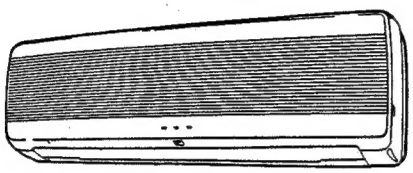
SERVICE MANUAL

TECHNICAL INFORMATION

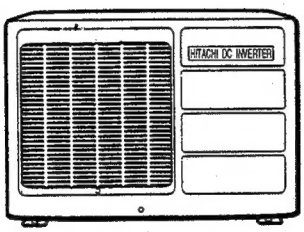
TC NO. 0720E

RAS-25CNH1 / RAC-25CNH1

REFER TO THE FOUNDATION MANUAL AND SERVICE MANUAL TC NO.0700E.



RAS-25CNH1



RAC-25CNH1

CONTENTS

SPECIFICATIONS

TYPE		WALL TYPE	
		INDOOR UNIT	OUTDOOR UNIT
MODEL		RAS-25CNH1	RAC-25CNH1
POWER SOURCE		1ø 220V – 240V 50Hz	
TOTAL INPUT	(W)	920 (320 ~ 1,150) [COOL] ／ 1,160 (280 ~ 1,350) [HEAT]	
TOTAL AMPERES (RATED / MAX.)	(A)	4.6 – 4.3／5.1 – 4.7 [COOL] ／ 5.8 – 5.3／7.4 – 7.4 [HEAT]	
COOLING CAPACITY	(kW)	2.50 (0.90 ~ 2.80)	
	(B.T.U./h)	8,530 (3,070 ~ 9,550)	
HEATING CAPACITY	(kW)	3.60 (0.90 ~ 4.30)	
	(B.T.U./h)	12,280 (3,070 ~ 14,670)	
DIMENSIONS (mm)	W	798	700 (+53) ※
	H	265	570
	D	168 (+10) ※	210 (+35) ※
NET WEIGHT	(kg)	6.5	29

※After installation

SPECIFICATIONS AND PARTS ARE SUBJECT OT CHANGE FOR IMPROVEMENT

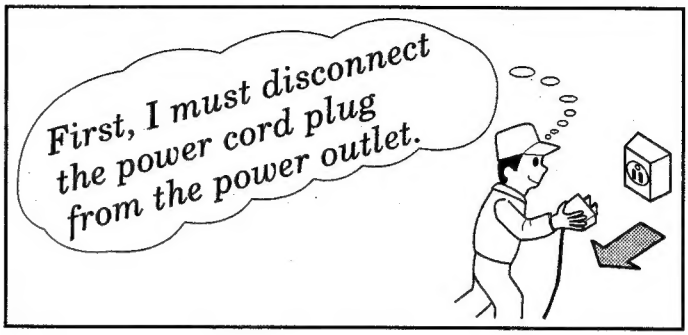
ROOM AIR CONDITIONER

INDOOR UNIT + OUTDOOR UNIT

JANUARY 1997 Tochigi Operation, Refrigeration & Air-Conditioning Division

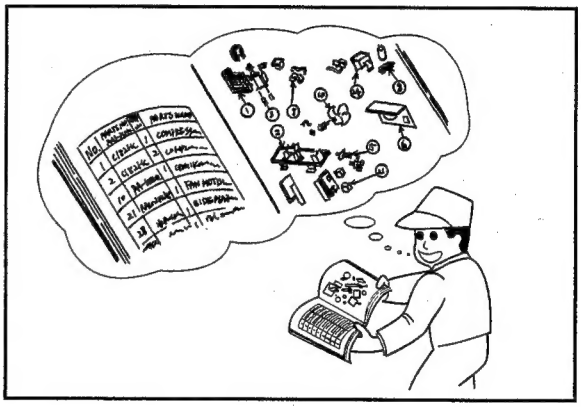
SAFETY DURING REPAIR WORK

1. In order to disassemble and repair the unit in question, be sure to disconnect the power cord plug from the power outlet before starting the work.



2. If it is necessary to replace any parts, they should be replaced with respective genuine parts for the unit, and the replacement must be effected in correct manner according to the instructions in the Service Manual of the unit.

> If the contacts of electrical parts are defective, replace the electrical parts without trying to repair them



3. After completion of repairs, the initial state should be restored.

4. Lead wires should be connected and laid as in the initial state.

5. Modification of the unit by the user himself should absolutely be prohibited.

6. Tools and measuring instruments for use in repairs or inspection should be accurately calibrated in advance.

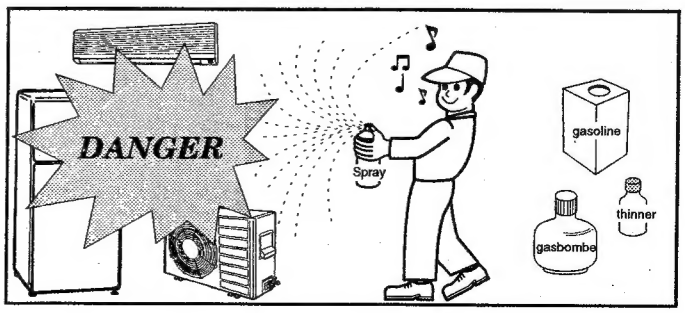
7. In installing the unit having been repaired, be careful to prevent the occurrence of any accident such as electrical shock, leak of current, or bodily injury due to the drop of any part.

8. To check the insulation of the unit, measure the insulation resistance between the power cord plug and grounding terminal of the unit.
   The insulation resistance should be 1MΩ or more as measured by a 500V DC megger.

9. The initial location of installation such as window, floor or the other should be checked for being safe enough to support the repaired unit again.
   If it is found not so strong and safe, the unit should be installed at the initial location after reinforced or at a new location.

10. Any inflammable object must not be placed about the location of installation.

11. Check the grounding to see whether it is proper or not, and if it is found improper, connect the grounding terminal to the earth.



WORKING STANDARDS FOR PREVENTING BREAKAGE OF SEMICONDUCTORS

1. Scope

The standards provide for items to be generally observed in carrying and handling semiconductors in relative manufactures during maintenance and handling thereof. (They apply the same to handling of abnormal goods such as rejected goods being returned.)

2. Object parts

(1) Micro computer

(2) Integrated circuits (I.C.)

(3) Field effective transistor (F.E.T.)

(4) P.C. boards or the like to which the parts mentioned in (1) and (2) of this paragraph are equipped.

3. Items to be observed in handling

(1) Use a conductive container for carrying and storing of parts. (Even rejected goods should be handled in the same way.)

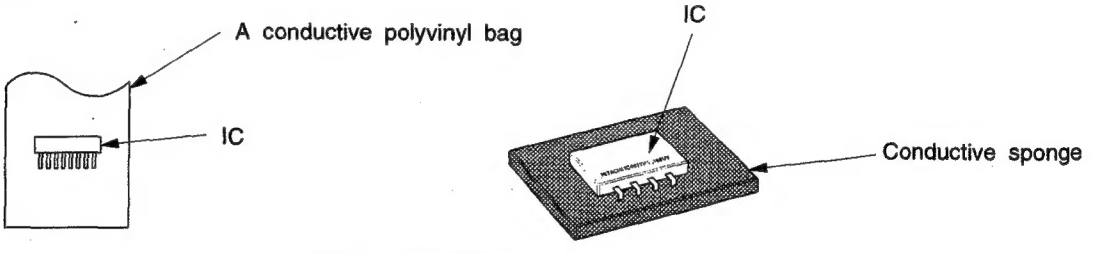


Fig. 1 Conductive container

(2) When any part is handled uncovered (in counting, packing and the like), the handling person must always use himself as a body earth. (Make yourself a body earth by passing one M ohm earth resistance through a ring or bracelet.)

(3) Be careful not to touch the parts with your clothing when you hold a part even if a body earth is being taken.

(4) Be sure to place a part on a metal plate with grounding.

(5) Be careful not to fail to turn off power when you repair the printed circuit board. At the same time, try to repair the printed circuit board on a grounded metal plate.

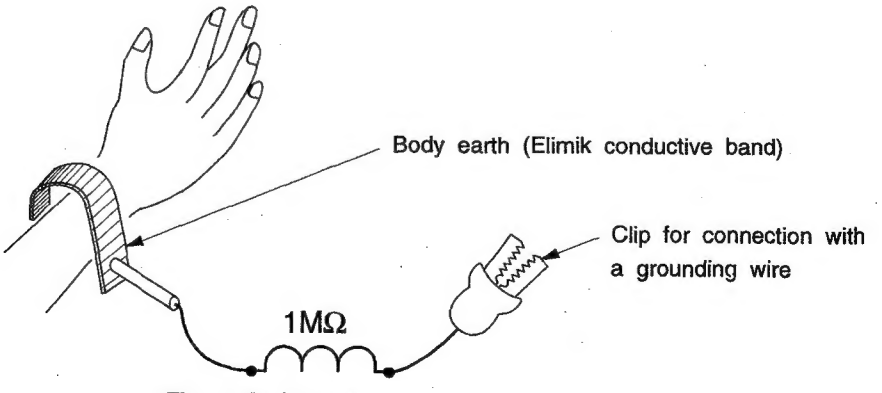


Fig. 2 Body earth

(6) Use a three wire type soldering iron including a grounding wire.

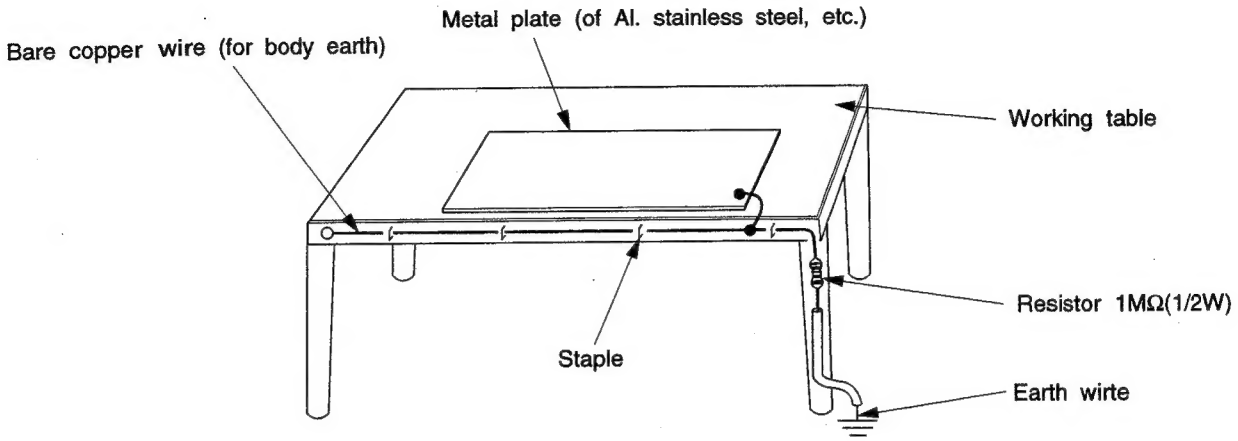


Fig.3 Grounding of the working table

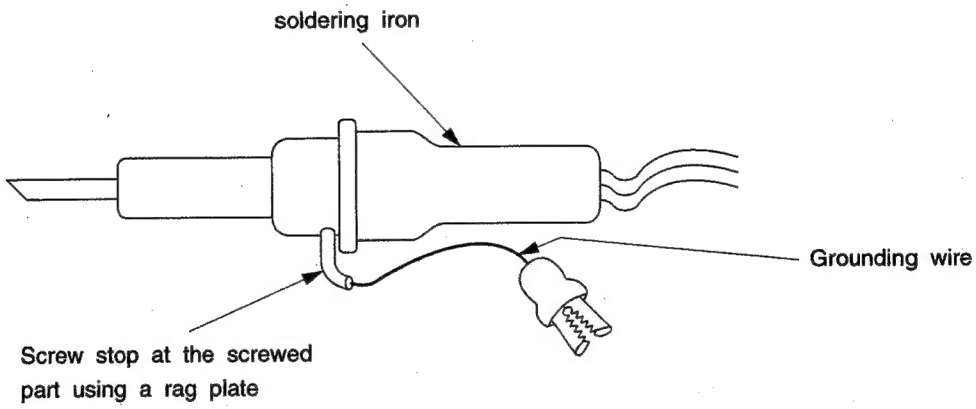


Fig.4 Grounding a solder iron

Use a high insulation mode (100V, 10MΩ or higher) when ordinary iron is to be used.

(7) In checking circuits for maintenance, inspection, or some others, be careful not to have the test probes of the measuring instrument shortcircuit a load circuit or the like.

⚠ CAUTION

1. In quiet operation or stopping the running, its heard slight flowing noise of refrigerant in the refrigerating cycle occasionally, but this noise is not abnormal for the operation.

2. When it thunders near by, it is recommend to stop the operation and to disconnect the power cord plug from the power outlet for safety.

3. The room air conditioner does not sart automaticaly after recovery of the electric power failure for preventing fuse blowing. Re-press START/STOP button after 3 minutes from when unit stopped.

4. If the room air conditioner is stopped by adjusting thermostat, or missoperation, and re-start in a moment, there is occasion that the cooling and heating operation does not start for 3 minutes, it is not abnormal and this is the result of the operation of IC delay circuit. This IC delay circuit ensures that there is no danger of blowing fuse or damaging parts even if operation is restarted accidentally.

5. This room air conditioner should not be used at the cooling operation when the outside temperature is below 10°C (50°F).

6. This room air conditioner (the reverse cycle) should not be used when the outside temperature is below −10°C (24°F).
   If the reverse cycle is used under this condition, the outside heat exchanger is frosted and efficiency falls.

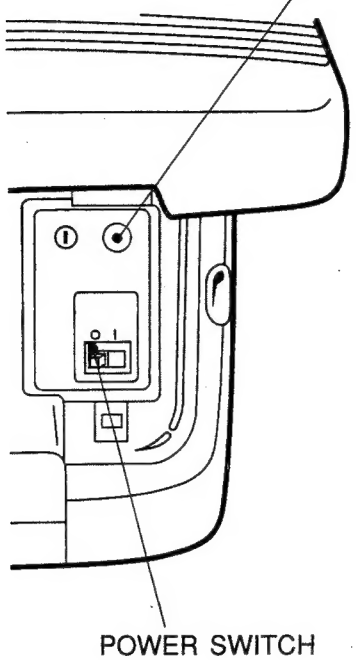
7. When the outside heat exchanger is frosted, the front is melted by operating the hot gas system, it is not trouble that at this time fan stops and the vapour may rise from the outside heat exchanger.

SPECIFICATIONS

MODEL		RAS-25CNH1	RAC-25CNH1
FAN MOTOR		20W	
FAN MOTOR PROTECTOR		NO	
COMPRESSOR		NO	G920DN6H
FUSE (for MICRO COMPUTER)		NO	3A
POWER RELAY, STICK RELAY		NO	G4A
REMOTE CONTROL SWITCH (LIQUID CRYSTAL)		YES	NO
TRANSFORMER		NO	
VARISTOR		NO	416NR
NOISE SUPPRESSOR		NO	YES
POWER SWITCH		YES	NO
TEMPORARY SWITCH		YES	NO
SERVICE SWITCH		NO	YES
THERMOSTAT		YES (IC)	NO
FUSE CAPACITY		——	15A INRUSH-WITHSTAND TYPE
REFRIGERANT CHARGING VOLUME (HCFC-22)	UNIT	——	680g
	PIPES (MAX. 8m)	WITHOUT REFRIGERANT BECAUSE COUPLING IS FLARE TYPE. P-145VK2 (5m), P-148VK2 (8m)	

HOW TO USE

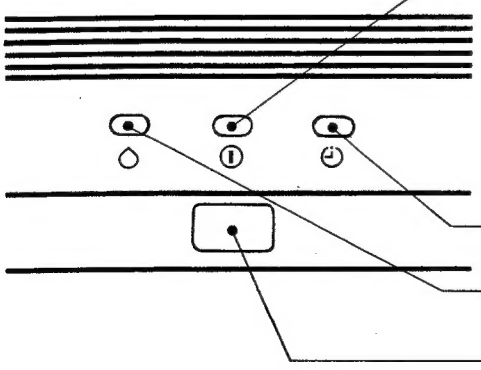
OPERATION INDICATOR



Use this switch to start and stop when the remote controller does not work.

- By pressing the temporary switch, the operation is done in previously set operation mode.
- When the operation is done using the temporary switch after the power source is turned off and turn on again, the operation is done in automatic mode.

COOLING UNIT INDICATORS



OPERATION LAMP
This lamp lights during operation.
The OPERATION LAMP flashes in the following cases during heating.
(1)During preheating
For about 2~3 minutes after starting up.
(2)During deftrosting
Defrosting will be performed about once an hour when frost forms on the heat exchanger of the condensing unit, for 5~10 minutes each time.

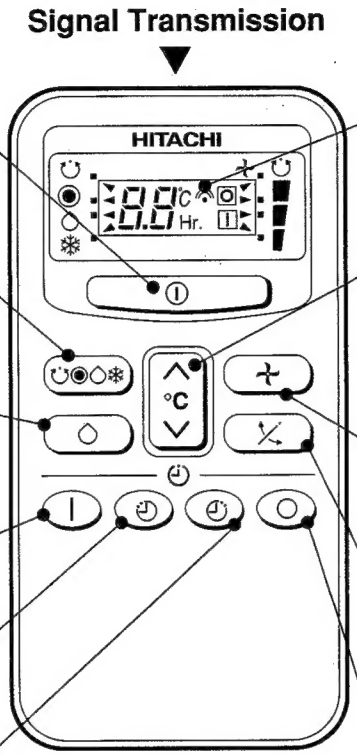
TIMER LAMP
This lamp lights when the timer is working.

DRY LAMP
This lamp lights during dehumidifying operation.

SIGNAL RECEIVER
There will be a beep sound when this receiver receives signal from remote controller.

NAMES AND FUNCTIONS OF REMOTE CONTROL UNIT

■ This controls the operation function and timer setting of the room air conditioner. The range of control is about 4 meters. If indoor lighting is controlled electronically, the range of control may be shorter.



ON/OFF Button

Press this button to start operation.
Press it again to stop operation.

FUNCTION Button

Select the operation mode.
(☞ Page 9)

DRY Button

Dehumidifying mode direct selection.
(☞ Page 8)

Reserve Button

Timer setting reservation.

OFF TIMER Button

Select the turn OFF time.

ON TIMER Button

Select the turn ON time.

Transmission Sign

The transmission sign blinks when a signal has been send.

TEMPERATURE Button

Room temperuture setting.
Value will change more quickly when keep pressing.
(☞ Page 7)

FAN SPEED Button

Select the fan speed for cooling and heating mode.
(☞ Page 9)

AUTO SWING Button

Control the angle of the horizontal air deflector.
(☞ Page 11)

CANCEL Button

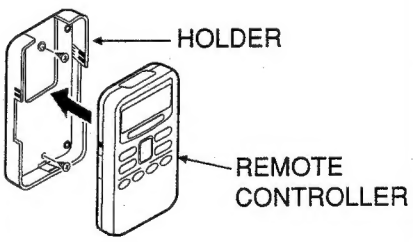
Cancel timer reservation.

Precautions for Use

- Do not put the remote controller in direct sunlight and high temperature.
- Do not drop it on the floor, and protect it from water.
- If you press the FUNCTION button during operation, the air conditioner may stop for about 3 minutes for protection before you can start it again.

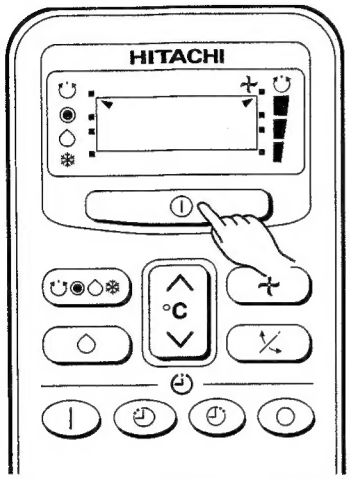
You can use the remote controller by fixing it on the wall with the accessory parts.

- Before fixing it, make sure the unit can be controlled by the remote control unit at the fixing position.



AUTOMATIC OPERATION

■ The device will automatically determine the mode of operation, HEAT, COOL, or Dehumidify, depending on the initial room temperature. The selected mode of operation will not change when the room temperature varies.



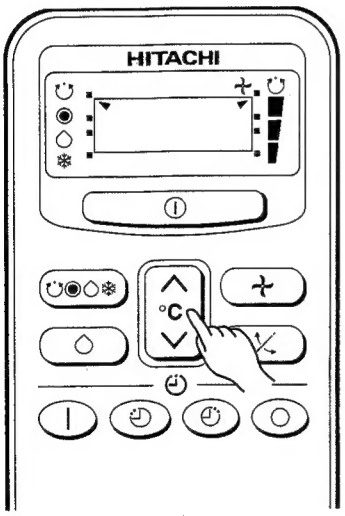
1 Press the ⏻ (START/STOP) button

- Operation start with a "beep" sound.

STOP Press the ⏻ (START/STOP) button

- Make sure the ↻ (Automatic) mode have been selected by using the (FUNCTION) button.
- The fan speed selector does not work at this operation.

■ You can slightly adjust the room temperature.



1 Press the ∧ °C ∨ (ROOM TEMPERATURE) button

- Temperature setting change by 1°C for each 1 time press.

∧ °C ∨ ◄ Up
◄ Down

- You can raise or lower the temperature setting by a maximum of 3°C.
- The display does not indicate the preset temperature in the Automatic mode. Device will receive the setting by a "beep".

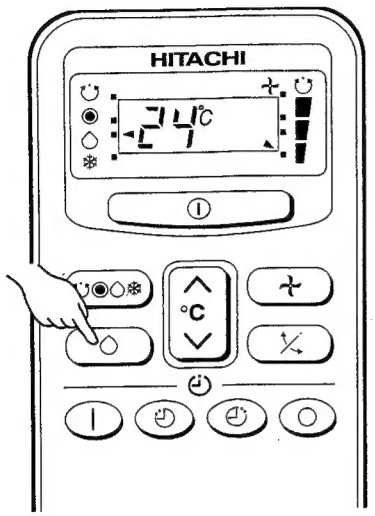
■ CONDITION OF AUTOMATIC OPERATION

- The selected mode of operation will not change during the operation even though the room temperature change.

INITIAL ROOM TEMPERATURE (APPROX.)	FUNCTION	TEMPERATURE SETTING	FAN SPEED
Over 27°C ➡	COOL	27°C	HIGH at start, LOW after the preset temperature is reached
23 ~ 27°C ➡	DRY	Slightly lower than the room temperature	LOW
Under 23°C ➡	HEAT	23°C	HIGH at start, MED or LOW after the preset temperature is reached

DEHUMIDIFYING OPERATION

■ Use the device for dehumidifying when the room temperature is over 16°C.



1 **Press the (DRY) button**

- Operation start with a "beep" sound.

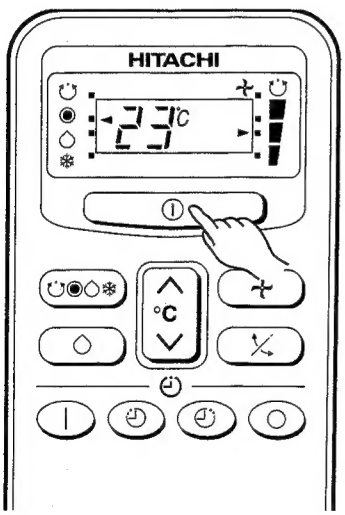
STOP **Press the (START/STOP) button**

- When you want to change the operation mode, please use the **(FUNCTION) button.**

- Set the desired temperature.
- You also can use the function button to select this operation.

HEATING OPERATION

■ Use the device for heating when the outdoor temperature is under 21°C.



1 **Press the (START/STOP) button**

- Operation start with a "beep" sound.

STOP **Press the (START/STOP) button**

- Make sure the ◉ (Heat) mode have been selected by using the **(FUNCTION) button.**

- You can select the fan speed and desired temperature.
- The range of 20~24°C is recommended as the room temperature for heating. If the temperature setting is 20°C, the room temperature will be controlled at around 20°C.

- The temperature setting and the actual room temperature may vary somewhat depending on conditions.

- As the settings are stored in memory of the remote controller, you only have to press the (START/STOP) button next time.

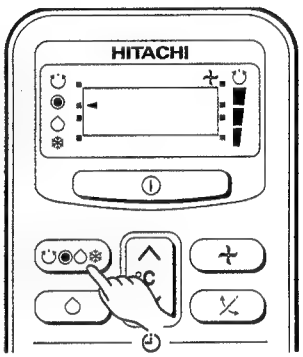
Auto Fresh Defrosting will work in the following cases:

Auto Fresh Defrosting will start when even heating operation has stopped with the (START/STOP) button pressed, during the off-timer operates or when the outdoor heat exchanger is cold. This defrosting will last for 5-10 minutes.

MANUAL OPERATION [Heating • Dehumidifying • Cooling]

■ Please use under below condition when you want to set the function mode, room temperature and fan speed by manually.

HEATING	DEHUMIDIFYING	COOLING
Outdoor Temperature 21°C below	Room Temperature 16°C above	Outdoor Temperature 22°C above

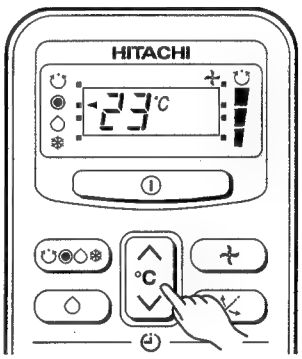


1 OPERATION MODE SELECTION

- Every time you press the button, the mode will change as the below sequence

  ⟳ (Auto) → ◉ (Heat) → ◇ (DRY) → ❄ (Cool)

2 ROOM TEMPERATURE SETTING



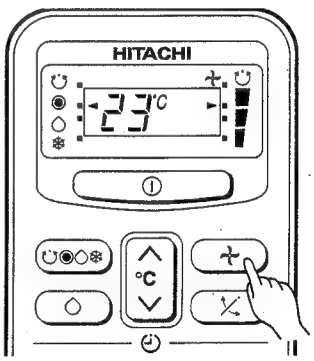
◄ Up
◄ Down

■ Recommend Temperature

Heating	20~24°C
Dehumidifying	20~26°C
Cooling	25~28°C

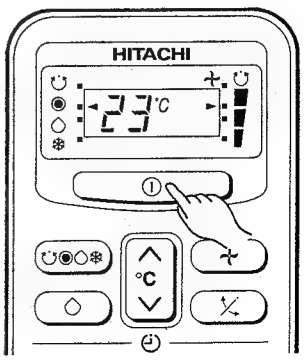
- The cooling operation does not start if the temperature setting is higher than the current room temperature.

3 FAN SPEED SETTING



- Every time you press the button, fan speed will change as the below sequence.
- **HEATING** / **COOLING** : AUTO → HIGH → MED → LOW
- **DEHUMIDIFYING : LOW(FIXED)**

4 Press the ⏻ (START/STOP) button



- Operation start with a signal received sound "beep".

STOP Press the ⏻ (START/STOP) button

- As the settings are stored in memory in the remote control unit, you only have to press the ⏻ (Start/Stop) button in order to use the same setting next time.

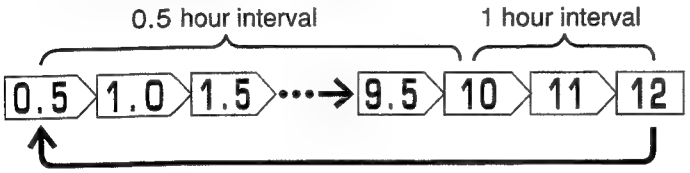
TIMER RESERVATION

■ ON Timer and OFF Timer are available.

OFF Timer Reservation

1 (OFF) OFF TIME setting

- Select the OFF TIME by pressing the (OFF) Button.
- Setting time will change according to the below sequence when you press the button.



- The value change more quickly if you keep pressing the button.

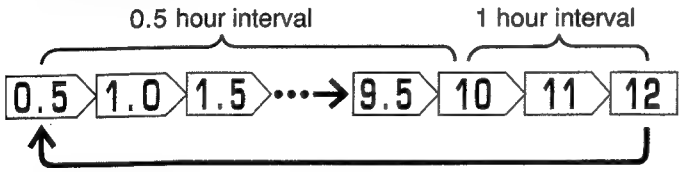
2 Press the (Reserve) button

- OFF TIMER reserved with a signal received sound "beep".
- The ⊡ (OFF) Mark starts lighting instead of blinking.

ON Timer Reservation

1 (ON) ON TIME setting

- Select the ON TIMER by pressing the (ON) Button.
- At the beginning of setting, time 6 hours was set.
- Setting time will change according to the below sequence.



- The value change more quickly if you keep pressing the button.

2 Press the (Reserve) button

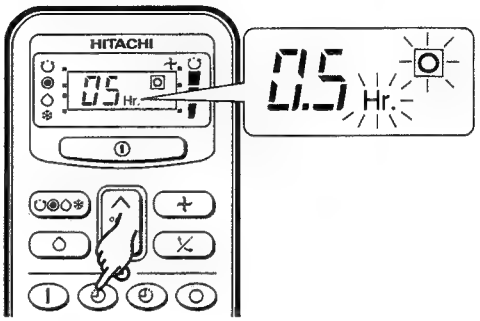
- ON TIMER reserved with a signal received sound "beep".
- The ⊡ (ON) Mark starts lighting instead of blinking.

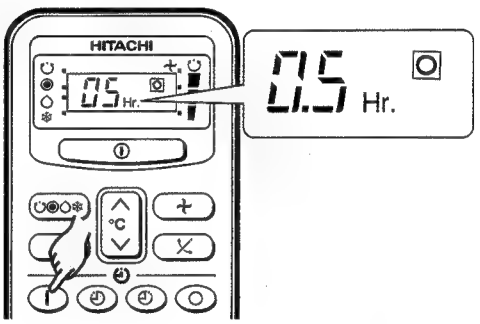
CANCELLATION of Timer Reservation

1 Press the (Cancel) button

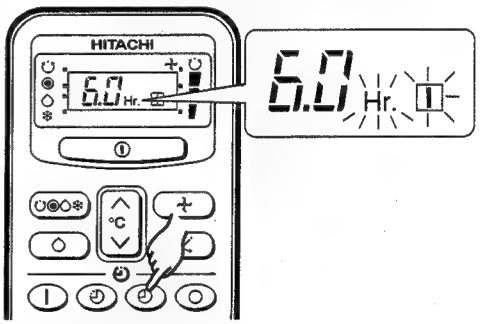
- As the time settings are stored in remote controller memory, you only have to press the (Reserve) button in order to use the same setting next time.

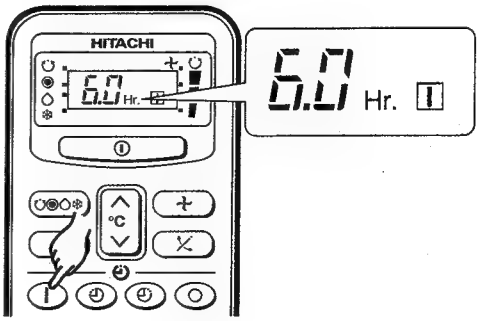
■ Operation stop at setting time





■ Operation will start for setting temperature at setting time (The starting time may different depend on the room temperature and set temperature).

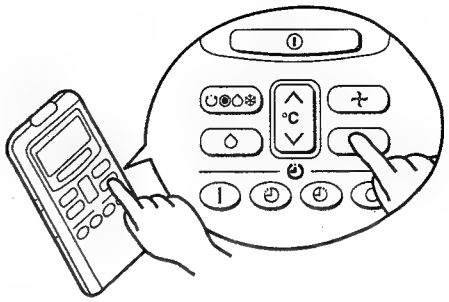




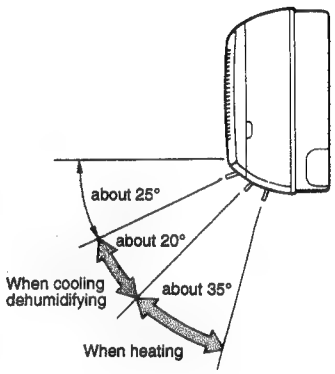
ADJUSTING THE AIR DEFLECTOR

1 Adjustment of the conditioned air in the upward and downward directions.

According to operation, the horizonal air deflector is automatically set to the proper angle suitable for each operation. The deflector can be swing up and down and also set to the desired angle using the " (AUTO SWING)" button. (If the angle of the deflector is changed, it will not return to the auto-set position after operations start unless the operation mode is swiched.)



- If the " (AUTO SWING)" button is pressed once, the horizontal air deflector swings up and down. If the button is pressed again, the deflector stops in its current position. Several seconds (about 6 seconds) may be required before the deflector starts to move.
- Use the horizontal air deflector within the adjusting range shown on the right.
- When the operation is stopped, the horizontal air deflector moves and stops at the position where the air outlet closes.

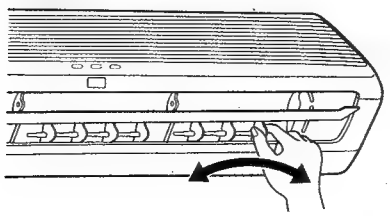


⚠ CAUTION

- In "Cooling" operation, do not keep the horizontal air deflector swinging for a long time. Some dew may form on the horizontal air deflector and some dew drops may fall from it.

2 Adjustment of the conditioned air to the left and right.

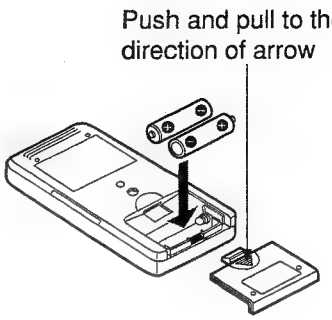
Hold the vertical air deflector as shown in the figure and adjust the conditioned air to the left and right.



HOW TO EXCHANGE THE BATTERIES IN THE REMOTE CONTROLLER

1. Remove the cover as shown in the figure and take out the old batteries.

2. Install the new batteries.
The direction of the batteries should match the marks in the case.

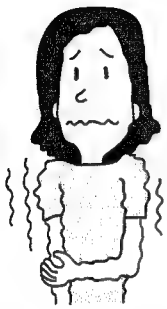


⚠ CAUTION

1. Do not use new and old batteries, or different kinds of batteries together.
2. Take out the batteries when you do not use the remote controller for 2 or 3 months.
3. The batteries must be of the LRO3 type.

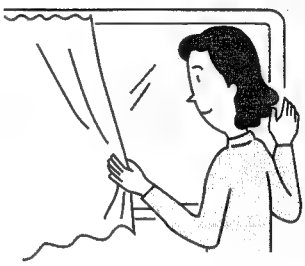
THE IDEAL WAYS OF OPERATION

Suitable Room Temperature



⚠ Warning
Freezing temperature is bad for health and a waste of electric power.

Install curtain or blinds



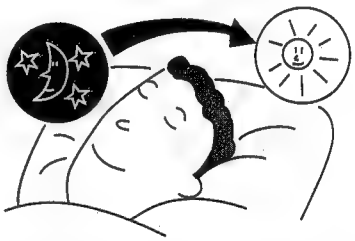
It is possible to reduce heat entering the room through windows.

Ventilation

⚠ Caution
Do not close the room for a long period of time. Occasionally open the door and windows to allow the entrance of fresh air.

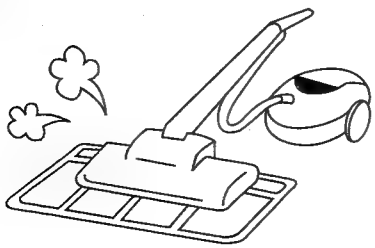
Effective Usage Of Timer

At night, please use the "OFF or ON timer operation mode", together with your wake up time in the morning. This will enable you to enjoy a comfortable room temperayure. Please use the timer effectively.



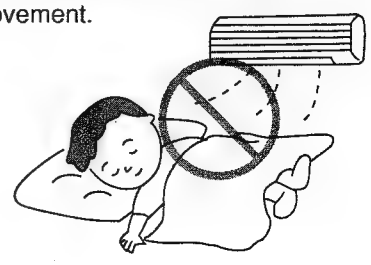
Do Not Forget To Clean The Air Filter

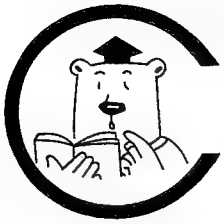
Dusty air filter will reduce the air volume and the cooling efficiency. To prevent from wasting electric energy, please clean the filter every 2 weeks.



Please Adjust Suitable Temperature For Baby And Children

Please pay attention to the room temperature and air flow direction when operating the unit for baby, children and old folks who have difficulty in movement.

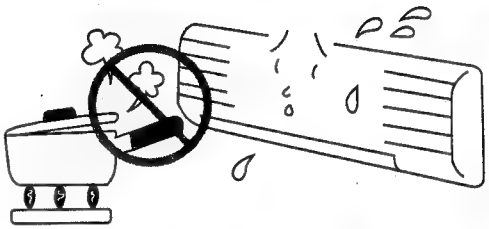




FOR USER'S INFORMATION

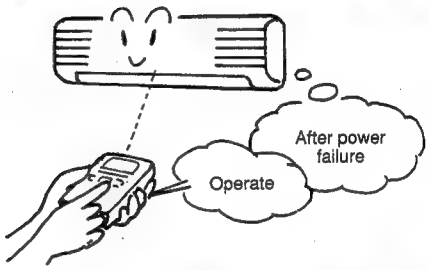
The Air Conditioner And The Heat Source In The Room

⚠ Caution
If the amount of heat in the room is above the cooling capability of the air conditioner (for example: more people entering the room, using heating equipments and etc.), the preset room temperature cannot be achieved.



After Power Failure

When the power is resumed after a power failure, the cooling unit will still remain "OFF". To operate the unit, please press the "ON/OFF" button again.

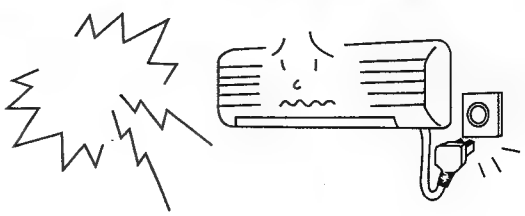


Not Operating For A Long Time

When the cooling unit is not to be used for a long period of time, please switch off the power from the mains. If the power from mains remains "ON", the cooling unit still consumes about 8W in the operation control circuit even if it is in "OFF" mode.

When Lightning Occurs

⚠ Warning
To protect the whole unit during lightning, please stop operating the unit and remove the plug from the socket.



MAINTENANCE

⚠ CAUTION

Before the cleaning, stop operation and disconnect the power supply.

1. AIR FILTER

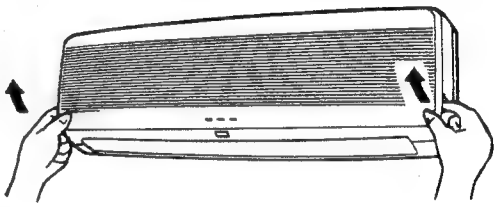
Clean the air filter, as it removes dust inside the room. In case the air filter is full of dust, the air flow will decrease and the cooling capacity will be reduced. Further, noise may occur. Be sure to clean the filter following the procedure below.

PROCEDURE

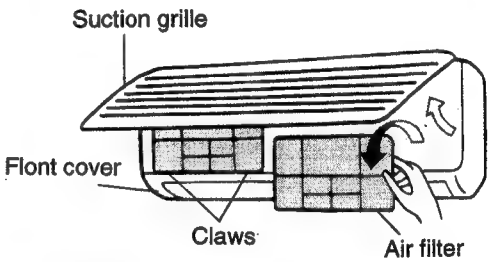
REMOVING METHOD

1 Remove the filter.

- Be sure to hold the buttom sides on the left and right of the front grille with both hands and pull up the grille forward.

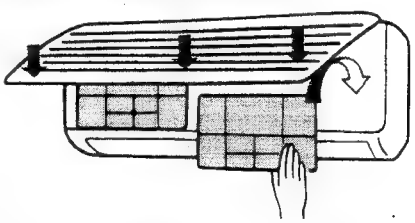


- Slightly lift the filter and release the claws (2 locations) at the lower part of the front cover and remove the filter from the lower side.



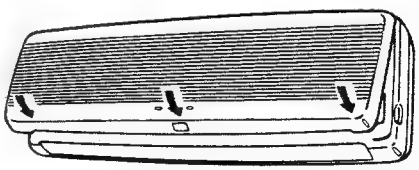
2 Remove dust from the filter using a vacum cleaner. If there is too much dust, use neutral detergent. After using neutral detergent, wash with clean water and dry in the shade.

INSTALLATION METHOD



3 Install the filters. (Set them with "FRONT" mark facing front.)

- Be sure to hold the front grille with both hands and close it, then push the three sections indicated by the arrows.

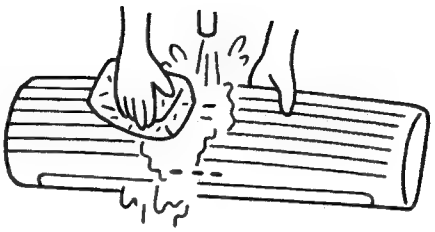


⚠ CAUTION

- Do not wash with hot water at more than 40°C. The filter may shrink.
- When washing it, shake off moisture completely and dry it in the shade; do not expose it directly to the sun. The filter may shrink.
- Do not operate the air conditioner with the filter removed. Dust may enter the air conditioner and cause trouble.

2. Washable Suction Grille

- The suction grille remove and can wash with clean water in whole.
  Wash it with a soft sponge.
  After using neutral detergent, wash thoroughly with clean water.

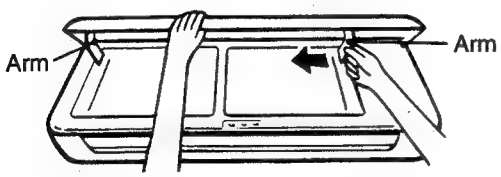


- When it is not removed, wipe it with a soft dry cloth.
  Wipe the remote controller thoroughly with a soft dry cloth.

- Wipe the water thoroughly.
  If the water remains at indicators or signal receiver of cooling unit, it causes trouble.

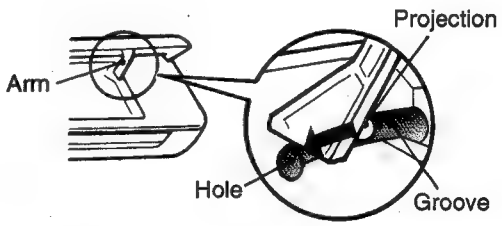
Method to remove of the suction grille.
Be sure to hold the suction grille with both hands to detach and attach it.

Removing the Suction Grille



- When the suction grille is fully opened with both hands, push the right arm to the inside to release it, and while closing the suction grille slightly, put it out forward.

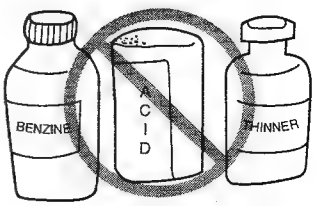
Attaching the Suction Grille



- Move the projections of the left and right arms into the grooves in the unit and securely insert them into the holes.

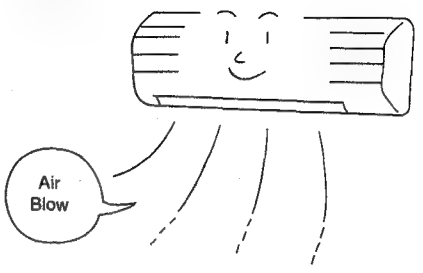
⚠ CAUTION

- Do not splash or direct water to the body of the unit when cleaning it as this may cause short circuit.
- Never use hot water (above 40°C), benzine, gasoline, acid, thinner or a brush, because they will damage the plastic surface and the coating.



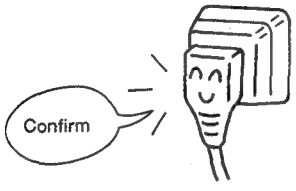
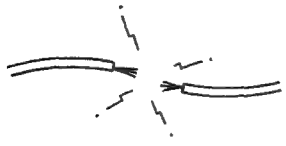
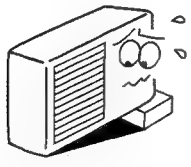
3. MAINTENANCE AT BEGINNING OF LONG OFF PERIOD

- Running the unit setting the operation mode to ❄ (COOL), the temperature to 32°C and the fan speed to HI for about half a day on a fine day, and dry the whole of the unit.
- Disconnect the power plug.



REGULAR INSPECTION

PLEASE CHECK THE FOLLOWING POINTS EVERY EITHER HALF YEARLY OR YEARLY. CONTACT YOUR SALES AGENT SHOULD YOU NEED ANY HELP.

1		Is the plug of power line firmly plugged into the socket? (Please ensure no loose contact between them).
2		Is the earth line disconnected or broken?
3		Is the mounting frame seriously affected by rust and is the condensing unit tilted or unstable?

AFTER SALE SERVICE

1 WHEN ASKING FOR SERVICE, CHECK THE FOLLOWING POINTS.

CONDITION	CHECK THE FOLLOWING POINTS
When it does not operate	• Is the fuse all right? • Is the voltage extremely high or low? • Is the power switch "ON"?
When it does not cool well	• Is the air filter blocked with dust? • Does sunlight fall directly on the condensing unit? • Is the air flow of the condensing unit obstructed? • Are the doors or windows opened, or is there any source of heat in the room? • Is the set temperature suitable?

Notes

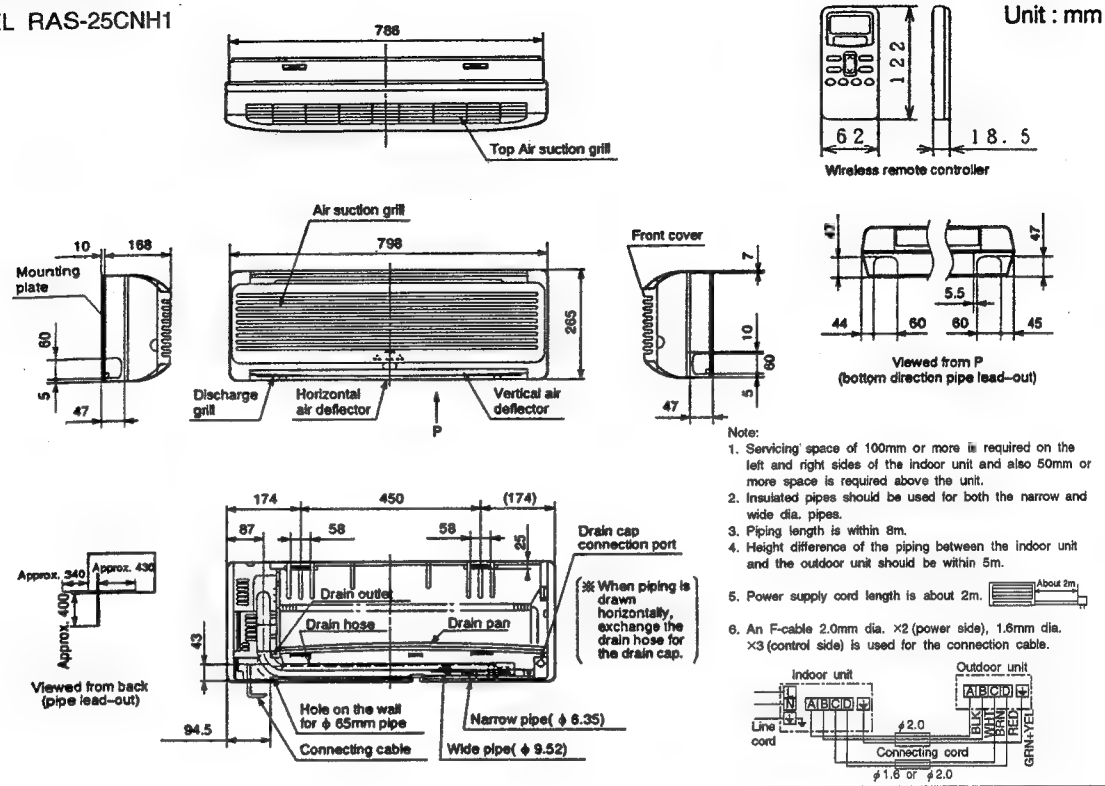
- In quiet operation or stopping the running, the following phenomena may occassionally occur, but they are not abnormal for the operation.
  (1) Slight flowing noise of refrigerant in the refrigerating cycle.
  (2) Slight rubbing noise from the fan casing which is cooled and then gradually warmed as operation stops.
- The odor will possibly be emitted from the room air conditioner because the various odor, emitted by smoke, foodstuffs, cosmetics and so on, sticks to it. So please clean the air filter and the evaporator regularly to reduce the odor.

- Please contact your sales agent immediately if the air conditioner still fails to operate normally after the above inspections. Inform your agent of the model of your unit, production number, date of installation. Please also inform him regarding the fault.

CONSTRUCTION AND DIMENTIONAL DIAGRAM

MODEL RAS-25CNH1

Unit : mm

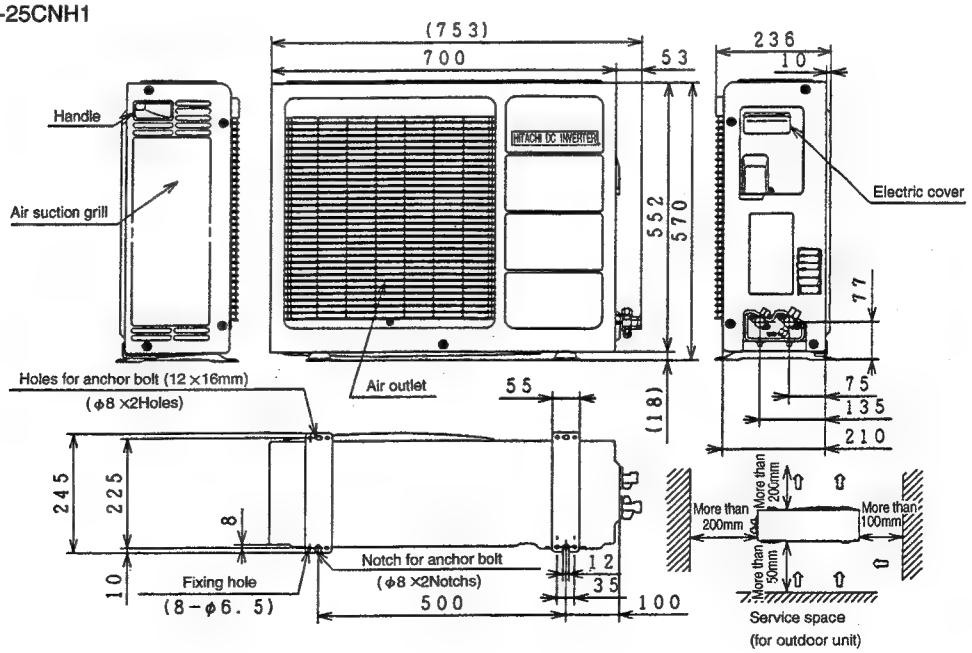


Note:

1. Servicing space of 100mm or more is required on the left and right sides of the indoor unit and also 50mm or more space is required above the unit.
2. Insulated pipes should be used for both the narrow and wide dia. pipes.
3. Piping length is within 8m.
4. Height difference of the piping between the indoor unit and the outdoor unit should be within 5m.
5. Power supply cord length is about 2m.

6. An F-cable 2.0mm dia. ×2 (power side), 1.6mm dia. ×3 (control side) is used for the connection cable.

MODEL RAC-25CNH1



Note:

1. 200mm or more serviceing spece is required above the outdoor unit.

MAIN PARTS COMPONENT

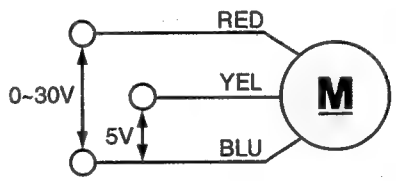
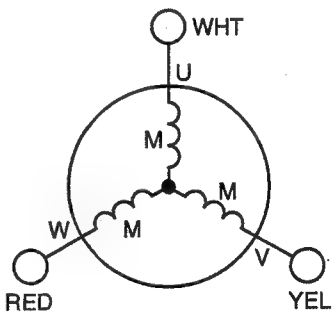
THERMOSTAT

Thermostat Specifications

MODEL			RAS-25CNH1	
THERMOSTAT MODEL			IC	
OPERATION MODE			COOL	HEAT
TEMPERATURE °C (°F)	INDICATION 16	ON	12.3 (54.1)	20.7 (69.3)
		OFF	12.0 (53.6)	19.3 (66.7)
	INDICATION 24	ON	19.6 (67.3)	28.7 (83.7)
		OFF	19.3 (66.7)	27.3 (81.1)
	INDICATION 32	ON	27.6 (81.7)	36.7 (98.1)
		OFF	27.3 (81.1)	35.3 (95.5)

FAN MOTOR

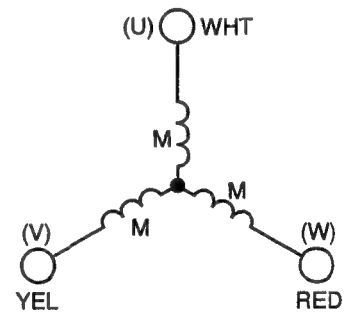
Fan Motor Specifications

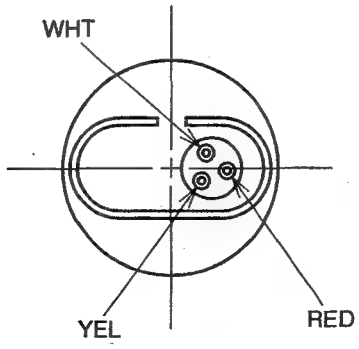
MODEL		RAS-25CNH1	RAC-25CNH1
POWER SOURCE		DC:5V, DC:0~30V	DC230V
OUT PUT		20W	20W
CONNECTION			
RESISTANCE VALUE (Ω)	20°C (68°F)	——	2M = 85
	75°C (167°F)	——	2M = 103.37

BLU : BLUE YEL : YELLOW BRN : BROWN WHT : WHITE
GRY : GRAY ORN : ORANGE GRN : GREEN RED : RED
BLK : BLACK PNK : PINK VIO : VIOLET

COMPRESSOR

Compressor Motor Specifications

MODEL		RAC-25CNH1
COMPRESSOR MODEL		G920DN6H
PHASE		SINGLE
RATED VOLTAGE		AC 220~240V
POWER SOURCE for COMPRESSOR		DC 280~300V
RATED FREQUENCY		50Hz
POLE NUMBER		4
CONNECTION		
RESISTANCE VALUE (Ω)	20°C (68°F)	2M = 1.07
	75°C (167°F)	2M = 1.28

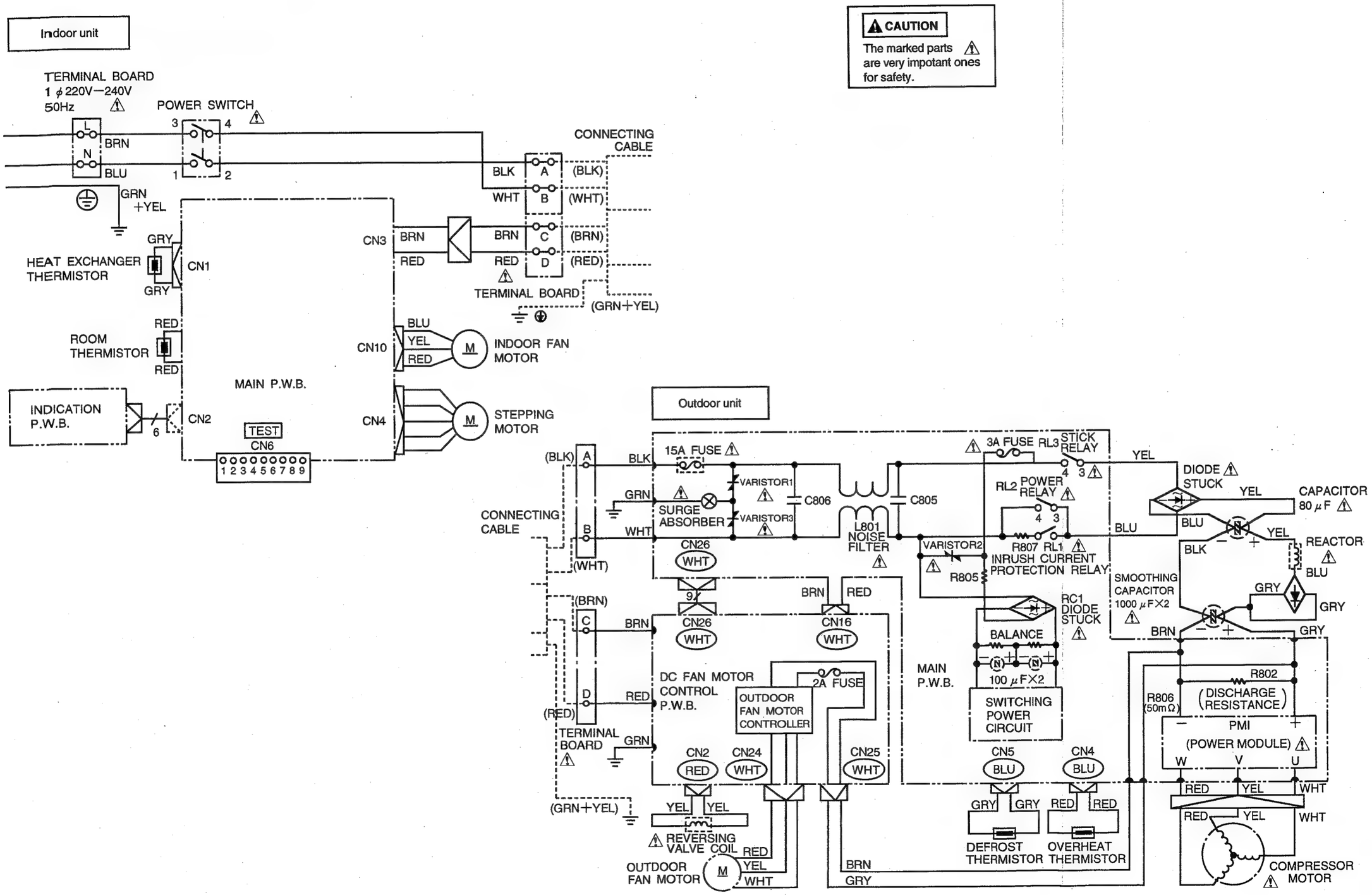


WIRING DIAGRAM

MODEL RAS-25CNH1/RAC-25CNH1

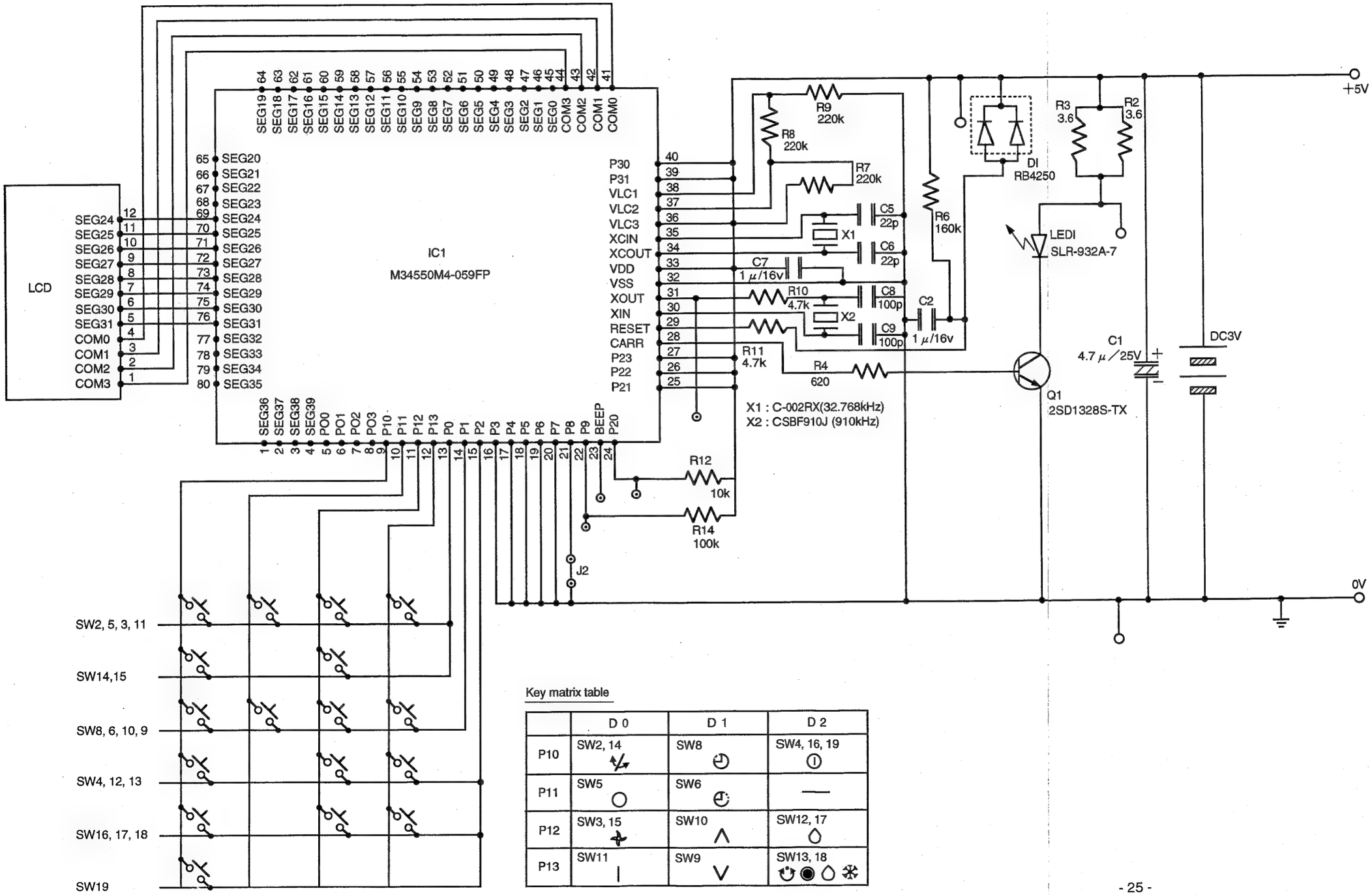
⚠ CAUTION

The marked parts ⚠ are very impotant ones for safety.



WIRING DIAGRAM OF THE PRINTED WIRING BOARD

Remote controller RAR-1M3A



Key matrix table

	D 0	D 1	D 2
P10	SW2, 14	SW8	SW4, 16, 19
P11	SW5	SW6	—
P12	SW3, 15	SW10	SW12, 17
P13	SW11	SW9	SW13, 18

MODEL RAS-25CNH1

RESISTOR

SYMBOL	RESISTANCE (Ω)	TOLERANCE	WATTAGE (W)
R101	1.0	±5%	1/4W
R102	10 K	±2%	1/10W
R103	1.2 K	±2%	1/10W
R104	1.0	±5%	1/4W
R201	10 K	±5%	1/10W
R202	10 K	±5%	1/10W
R203	5.1 K	±5%	1/10W
R204	5.1 K	±5%	1/10W
R205	1M	±5%	1/10W
R206	10 K	±5%	1/10W
R208	2.7 K	±5%	1/10W
R209	10 K	±5%	1/10W
R302	1 K	±5%	1/10W
R303	10 K	±5%	1/10W
R304	62 K	±5%	1/10W
R305	27 K	±5%	1/10W
R306	15 K	±5%	1/10W
R307	1 K	±5%	1/10W
R308	12.7 K	±1%	1/10W
R309	1 K	±5%	1/10W
R310	12.7 K	±1%	1/10W
R311	6.8 K	±5%	1/10W
R312	5.1 K	±5%	1/10W
R401	390	±5%	1/10W
R402	390	±5%	1/10W
R403	390	±5%	1/10W
R404	390	±5%	1/10W
R405	5.1 K	±5%	1/10W
R406	5.1 K	±5%	1/10W
R407	10 K	±5%	1/10W
R408	10 K	±5%	1/10W
R409	10 K	±5%	1/10W
R410	10 K	±5%	1/10W
R601	10 K	±5%	1/10W
R603	10 K	±5%	1/10W
R606	10 K	±5%	1/10W
R607	10 K	±5%	1/10W
R608	1 K	±5%	1/10W
R609	1 K	±5%	1/10W
R610	1 K	±5%	1/10W
R611	10 K	±5%	1/10W
R612	10 K	±5%	1/10W
R616	1 K	±5%	1/10W
R701	1 K	±5%	1/10W
R702	390	±5%	1/10W
R703	200	±5%	1/10W
R704	200	±5%	1/10W
R705	1 K	±5%	1/10W
H R706	1 K	±5%	1/10W
H R707	10	±5%	1/10W
R801	3.3 K	±5%	1/10W
R802	1 K	±5%	1/10W
R810	5.1 K	±5%	1/10W
R811	5.1 K	±5%	1/10W
R812	20	±5%	1/4W
R813	20	±5%	1/4W

SYMBOL	RESISTANCE (Ω)	TOLERANCE	WATTAGE (W)
R901	20 K	±1%	1/10W
R902	300	±5%	1/10W
R903	2.21 K	±1%	1/10W
R904	2.0 K	±5%	2W
R905	2.0 K	±5%	2W
R906	1.5	±5%	1/4W
R909	1.5	±5%	1/4W
R910	1.5	±5%	1/4W
R911	1.5	±5%	1/4W
R915	1.5	±5%	1/4W
R920	3.3 K	±5%	1/10W
R921	3.3 K	±5%	1/10W
R930	1 K	±1%	1/10W
R931	8.25 K	±1%	1/10W
R932	5.1 K	±5%	1/10W

CAPACITOR

SYMBOL	RATING	TYPE
C101	470 μ, 50V	D
C102	150 μ, 35V	D
C103	100 μ, 10V	D
C104	0.1 μ, 25V	C
C105	220P, 50V	C
C201	33 μ, 10V	D
C202	0.047 μ, 25V	C
C205	0.1 μ, 25V	C
C206	0.1 μ, 25V	C
C301	0.047 μ, 25V	C
C302	0.047 μ, 25V	C
C303	0.047 μ, 25V	C
C401	0.047 μ, 25V	C
C601	0.047 μ, 25V	C
C602	0.047 μ, 25V	C
H C701	33 μ, 10V	C
C702	1000P, 50V	C
C801	3300P, 50V	F
C802	30P, 50V	C
C803	0.022 μ, 50V	C
C804	0.01 μ, 50V	C
C805	0.22 μ, 50V	F
C806	150P, 50V	C
C807	0.22 μ, 50V	F
C901	220 μ, 50V	D
C933	10 μ, 16V	D
C940	10 μ, 16V	D
C942	0.1 μ, 25V	C

C : CERAMIC CAPACITOR
D : ELECTROLYTIC CAPACITOR
F : FILM CAPACITOR

TRANSISTOR

SYMBOL	MODEL
Q201	2SC2462LO
Q202	2SA1121SO
Q501	2SC4398
Q805	2SC4398
Q903	2SA1757F
Q904	2SC3624

DIODE

SYMBOL	MODEL
D101	G4DL-6140
D102	D1FS6
D401	HSM2838C
D403	HSM2836C
D501	LFB01
D901	D1FL20U
D902	LFB01

ZENER DIODE

SYMBOL	MODEL
ZD201	RLZ24

LED

SYMBOL	MODEL	COLOR
LD701	LN1251C	RED
LD702	SLR-332DC3F	ORANGE
LD703	SLR-342YC3F	YELLOW
LD704	SLR-332MC3F	GREEN

COIL

SYMBOL	RATING
L101	82 μH, 1.3A
L102	560 μH, 0.6A
L901	450 μH, 1.5A

IC

SYMBOL	MODEL
REG1	IR3M03AN
REG2	MC7805CT
IC1	HD6473714
IC401	X24C01S1
IC501	ULN2003ANS
IC901	ULN2003ANS

OVER CURRENT PROTECTOR

SYMBOL	MODEL
ICP	ICP-S0.5

OSCILLATOR

MODEL
EFOEC 8004A

■ Table of thermistor resistance

Room temperature detection thermistor

TEMP.(℃)	Resistance (Ω)
−5	44.10K
0	33.66K
5	25.95K
10	20.19K
15	15.84K
20	12.54K
※ 25	10.00K
30	8.04K
35	6.50K
40	5.30K
45	4.34K
50	3.58K

B 3950

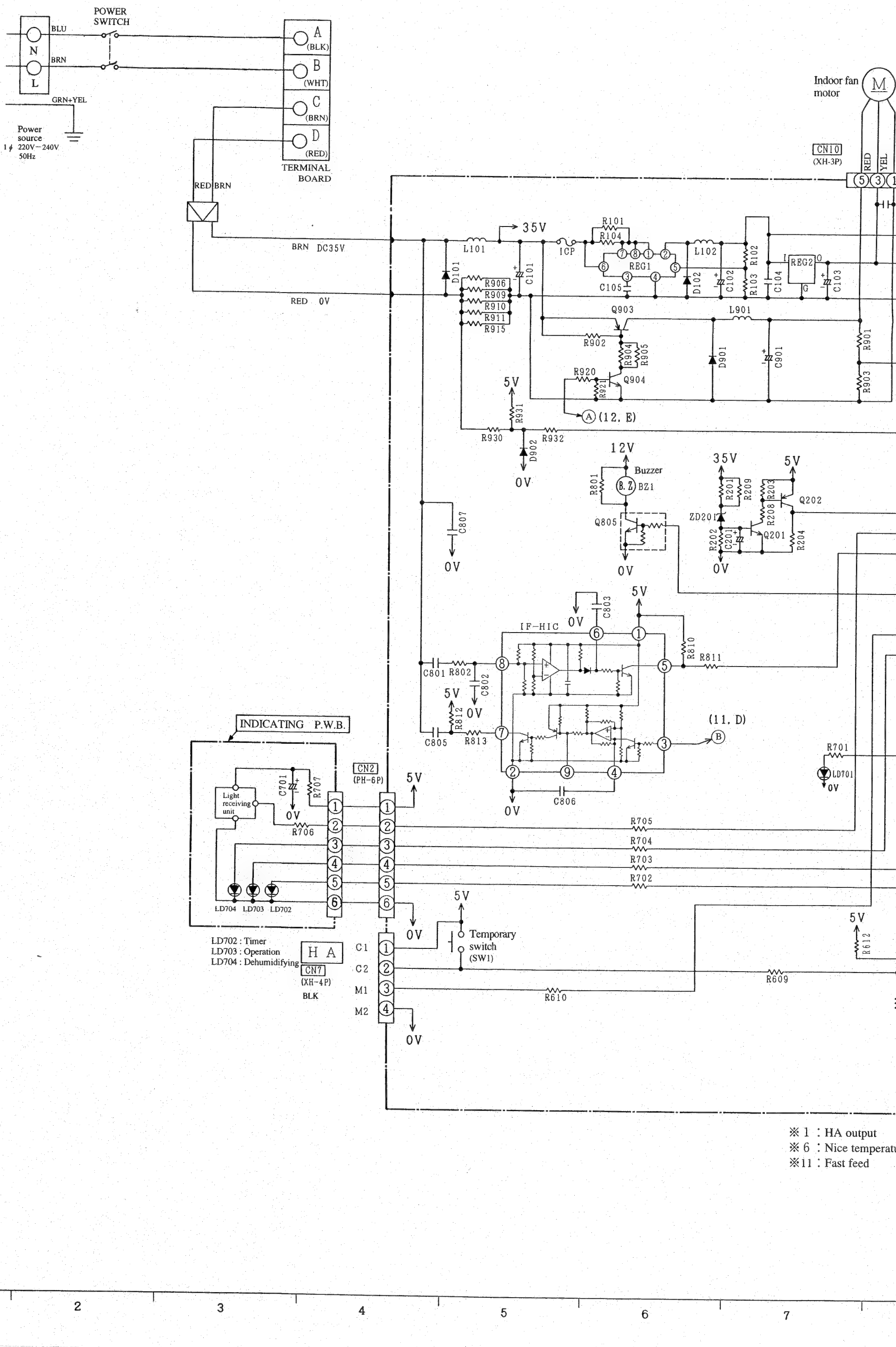
Heat exchanger thermistor

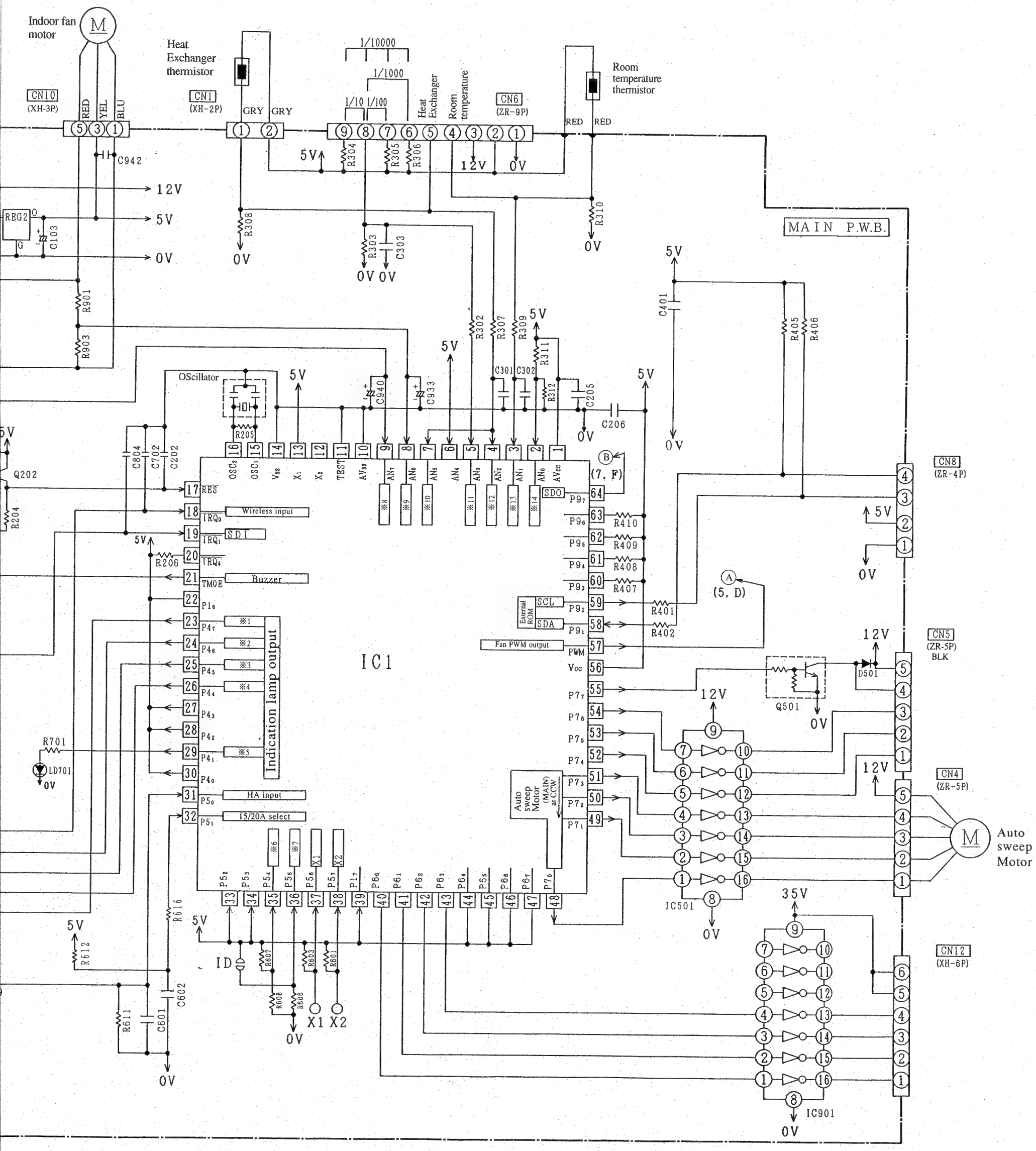
TEMP.(℃)	Resistance (Ω)
−15	80.13K
−10	59.67K
0	34.18K
5	26.26K
10	20.37K
20	12.57K
※ 25	10.00K
30	8.01K
35	6.47K
40	5.26K
50	3.54K
60	2.44K

B 4000

(Note)
Since the resistance values shown above are slightly changed due to unevenness of the parts, use as referance values.

MODEL RAS - 25CNH1





※1 : HA output
※2 : Dehumidifying lamp
※3 : Operation lamp
※4 : Timer lamp
※5 : Compressor operation lamp
※6 : Nice temperature cancel
※7 : Wireless ID
※8 : Fan current detection
※9 : Output divider
※10 : Discharging air temp.
※11 : Fast feed
※12 : Heat exchanger temp.
※13 : Room temp.
※14 : ROM select

MODEL RAC-25CNH1

RESISTOR

SYMBOL	RATED		
	RESISTANCE (Ω)	TOLERANCE	WATTAGE (W)
R101	180k	0.5%	1/2
R102	180k	0.5%	1/2
R103	180k	0.5%	1/2
R104	47k	1%	1/6
R105	47k	1%	1/6
R106	47k	1%	1/6
R201	220	5%	1/6
R202	64.9k	1%	1/6
R204	2.7k	5%	1/6
R205	5.1k	5%	1/6
R206	1k	0.5%	1/4
R207			
R208			
R209	1k	5%	1/6
R210	5.1k	5%	1/6
R211	7.5k	0.5%	1/5
R213	5.1k	5%	1/6
R214	5.1k	5%	1/6
R215	5.1k	5%	1/6
R216	1k	5%	1/6
R217			
R218			
R219	1k	5%	1/6
R220			
R221			
R222	1k	5%	1/6
R223	390	5%	1/6
R224	390	5%	1/6
R225	390	5%	1/6
R226	390	5%	1/6
R227	390	5%	1/6
R228	390	5%	1/6
R229	110k	2%	1/2
R230	110k	2%	1/2
R231	3.16k	1%	1/6
R232	3.0k	2%	1/4
R233	1.2k	5%	1/4
R236			
R237			
R238			
R301	1.27k	1%	1/6
R302	5.36k	1%	1/6
R303	3.01k	1%	1/6
R304	4k	5%	1/6
R305	4.3k	5%	1/6
R306	1.4k	5%	1/6
R307	5.1k	5%	1/6
R308	5.1k	5%	1/6
R309	1.0k	5%	1/6
R310			
R501	3.9	5%	1/2
R502	3.9	5%	1/2
R503	3.9	5%	1/2
R504	6.2	5%	1/2
R505	6.2	5%	1/2
R506	6.2	5%	1/2
R507	1k	5%	1/6
R508	1k	5%	1/6
R509	1k	5%	1/6

SYMBOL	RATED		
	RESISTANCE (Ω)	TOLERANCE	WATTAGE (W)
R601	3.9	5%	1/2
R602	3.9	5%	1/2
R603	3.9	5%	1/2
R604	6.2	5%	1/2
R605	6.2	5%	1/2
R606	6.2	5%	1/2
R607	1k	5%	1/6
R702	20	5%	1/4
R703	20	5%	1/4
R704	1k	5%	1/6
R705	33k	5%	1/6
R706	10k	5%	1/6
R801	470k	5%	1/2
R802	470k	5%	1/2
R805	5.1	5%	5
R806	50m	1%	5
R807	430	5%	10
R810	220k	5%	1/4
R811	220k	5%	1/4
R901			
R902	7.5k	0.5%	1/5
R903	3.3k	1%	1/6
R904	1.8k	1%	1/6
R905	7.5k	0.5%	1/5
R906			
R907	150	1%	1/6
R908	3k	2%	1/4
R909	26.7k	1%	1/6
R910	5.1k	1%	1/6
R911	47k	1%	1/6
R912	47k	1%	1/6
R913	47k	1%	1/6
R914	180k	0.5%	1/2
R915	180k	0.5%	1/2
R916	180k	0.5%	1/2
R917	2.2	2%	2
R918	30k	5%	1
R920	30k	5%	1
R922	30k	5%	1
R924	620	2%	1/4
R925	10k	5%	1/6
R926	1.5k	1%	1/6
R927	68k	5%	1/6

SYMBOL	RATED		
	RESISTANCE (Ω)	TOLERANCE	WATTAGE (W)
R1	470k	5%	1/4
R2	470k	5%	1/4
R3	100k	5%	2
R4	33	5%	1
R5	47	5%	2
R6	47	5%	2
R8	560	5%	1/4
R9	47	5%	1/6
R51	330	5%	1/6
R52	4.7k	5%	1/6
R53	8k	5%	1/6
R54	2k	1%	1/6
R62	2.2k	5%	2
R63	2.7k	5%	2
R64	2.2k	5%	2
JW1	NONE		
JW2	NONE		
JW4	NONE		

CAPACITOR

C : CERAMIC CAPACITOR
D : ELECTROLYTIC CAPACITOR
F : FILM CAPACITOR

SYMBOL	RATED		
	RATING(μF)	VOLTAGE (V)	TYPE
C101	1.5	100	D
C102	1.5	100	D
C103	1.5	100	D
C104	2.2	100	D
C105	2.2	100	D
C106	2.2	100	D
C201	10	50	D
C202	0.022	50	F
C204	47	6.3	D
C205	0.1	50	C
C206	47	6.3	D
C208	10	50	D

SYMBOL	RATED		
	RATING(μF)	VOLTAGE (V)	TYPE
C1	2200P	1k	C
C2	0.047	50	F
C3	100P	1k	C
C4	0.047	50	F
C5	0.022	50	F
C6	2200P	AC250	C
C51	4.7	50	D
C61	220	10	D
C62	220	10	D
C63	220	10	D
C64	180	10	D
C65	330	25	D
C66	180	10	D
C67	220	50	D
C501	100	6.3	D
C502	100	6.3	D
C503	100	6.3	D
C504	0.1	50	C
C505	0.1	50	C
C506	0.1	50	C
C601	100	6.3	D
C701	0.15	50	F
C702	0.022	50	F
C703			
C704	0.068	50	F
C706			
C708	0.15	50	F
C709	0.01	AC250	C
C710	0.01	AC250	C
C801	1000	420	D
C802	1000	420	D
C805	0.56	AC290	F
C806	0.56	AC290	F
C807			
C808			
C810	100	250	D
C811	100	250	D
C812	4700pF	AC250	C
C813	4700pF	AC250	C
C814	4700pF	AC250	C
C901	10	50	D
C902	10	50	D
C903	10	50	D
C904	10	50	D
C905	1	50	D
C906	4700pF	50	F
C907	0.1	50	F
C908	0.1	50	F
C909	0.1	50	F

SYMBOL	RATED		
	RATING(μF)	VOLTAGE (V)	TYPE
C911	10	100	D
C912	10	100	D
C913	10	100	D
C914	4.7	100	D
C915	4.7	100	D
C916	4.7	100	D
C917	4700pF	50	C
C918	4700pF	50	C
C919	4700pF	50	C
C920	220	10	D
C921	0.022	50	F

TRANSISTOR

SYMBOL	MODEL
Q201	AA1A4M
Q202	
Q203	
Q701	2SD2019
Q1	2SC4538
Q2	2SC2655-Y
Q901	AA1A4M
Q902	AN1A4M
Q903	AN1A4M
Q904	AN1A4M
Q905	AN1A4M
Q906	AA1A4M
Q907	AA1A4M
Q908	2SC3632
Q909	2SC3632
Q910	2SC3632

PHOTO COPULA

SYMBOL	MODEL
PQ501	PC922
PQ502	PC922
PQ503	PC922
PQ601	PC922
PQ602	PC922
PQ603	PC922
PQ701	PS2501
PI51	PC817C

IC

SYMBOL	MODEL
OP1	MC33272P
FAN-HIC	HX-2474A
DRIVER IC1	STA305A
DRIVER IC2	STA304A
HICI	8EHIC-N
POWER MODULE	MP6501
M51	HA17431P
M61	NJM7805FA

ZENER DIODE

SYMBOL	MODEL
ZD301	HZS7A1TA
ZD3	HZS2B2TA
ZD901	HZS7A1TA

LED

SYMBOL	MODEL
LD301	RED
LD302	RED
LD303	RED
LD304	

INDUCTOR

SYMBOL	MODEL
L1	INDUCTOR
L703	INDUCTOR
L802	
L804	INDUCTOR

VARIABLE RESISTOR

SYMBOL	RESISTANCE
VR11	5k
VR12	
VR2	500

DIODE

SYMBOL	MODEL
D201	1SS131
D1	ERB44-08
D2	1SS131
D4	1SS131
D61	UF4003
D62	UF4003
D63	UF4003
D64	UF4003
D65	RMPG06G
RC61	ERA92-02
RC62	YG902C2
D501	RMPG06G
D502	RMPG06G
D503	RMPG06G
D504	RMPG06G
D505	RMPG06G
D506	RMPG06G
D601	RMPG06G
D602	RMPG06G
D701	1SS131
D901	DINL40
D902	DINL40
D903	DINL40
D904	DINL40
D905	DINL40
D906	DINL40

■ Table of thermistor resistance

Over heat thermistor	
TEMP.(℃)	RESISTANCE (Ω)
20	43.63k
30	26.58k
40	16.71k
50	10.81k
60	7.18k
70	4.89k
80	3.40k
90	2.41k
100	1.74k
※ 110	1.28k
120	0.96k

B 4400

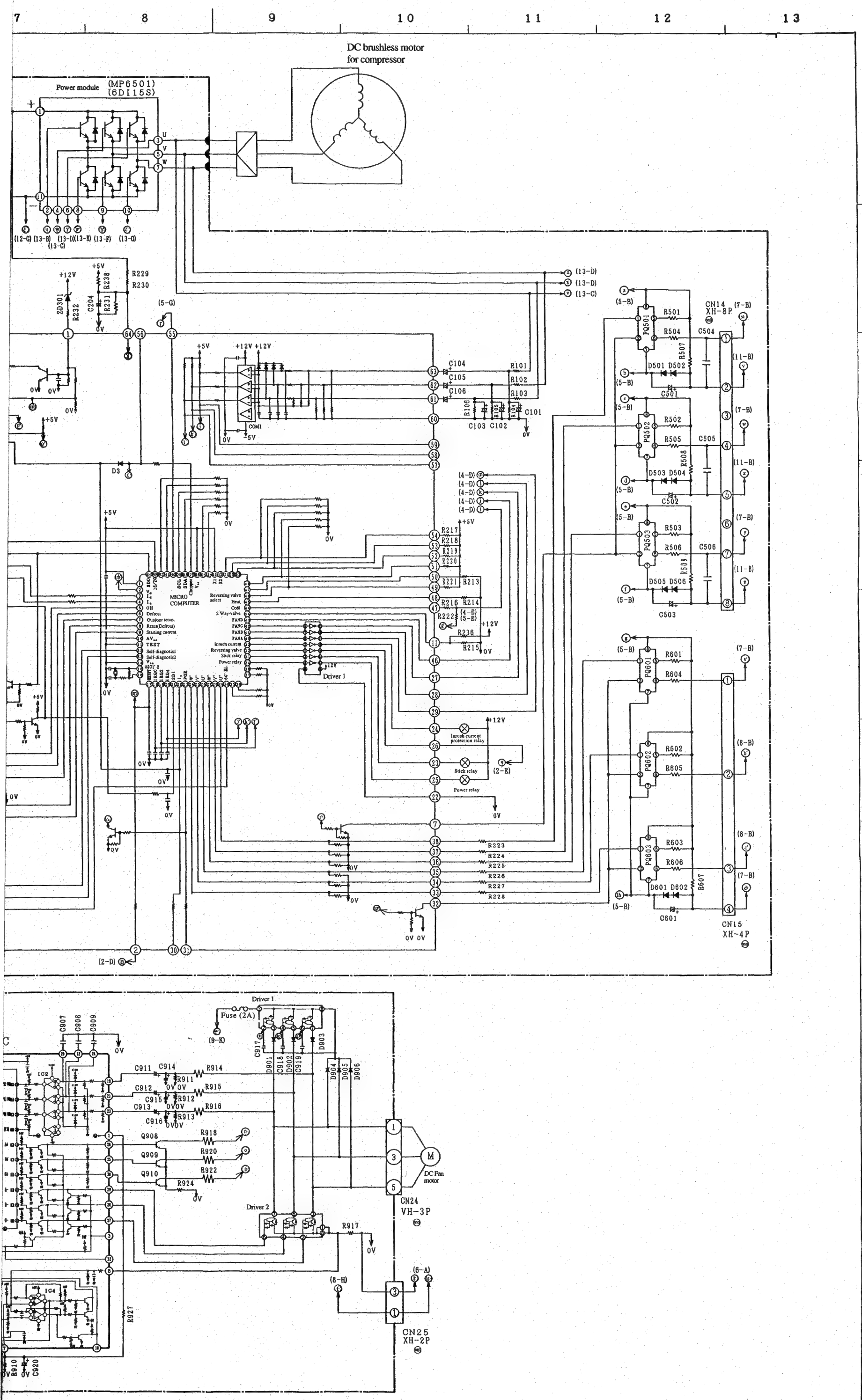
Electric expansion valve temp. (narrow pipes 1, 2, wide pipes 1, 2). external temp.defrost thermistor	
TEMP.(℃)	RESISTANCE (Ω)
-15	12.43k
-10	9.61k
-5	7.49k
※ 0	5.90k
5	4.69k
10	3.75k
15	3.03k
20	2.46k
25	2.01k
30	1.66k
35	1.37k
40	1.15k

B 3500

(Note)
Since the resistance values shown above are slightly changed due to unevenness of the parts, use as reference values.

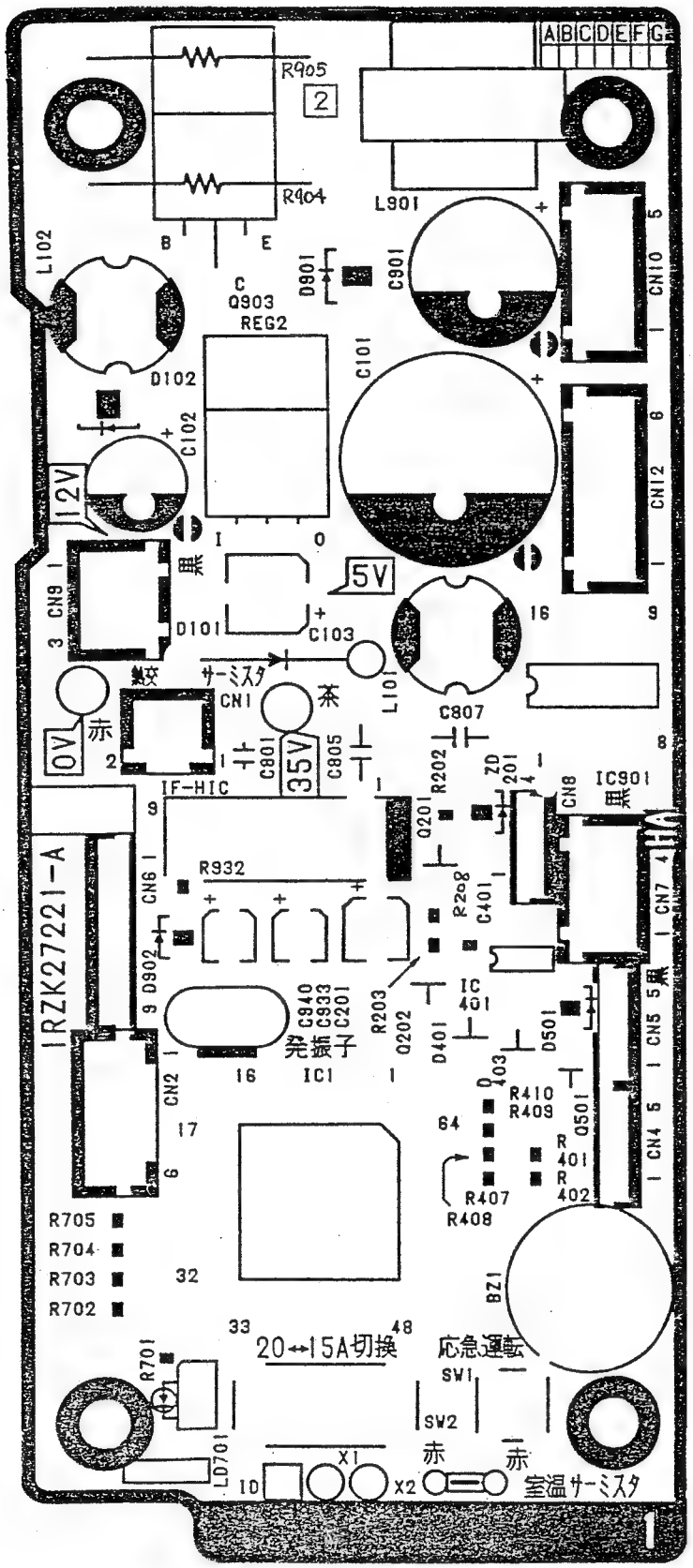
MODEL RAC - 25CNH1

Terminal board
Fuse (15A)
Noise filter coil
Fuse (3A)
Stick relay
BLK
GRN
WHT
Varistor1
Surge absorbor
Varistor3
Varistor2
L802
L804
C807
C806
C808
C805
C812
C813
Inrush current protection relay
R807
Power relay
(10-K)
Power module (MP6501) (6DI15S)
R801
R802
R806
0V
(5-C)
(12-G) (13-B) (13-C) (13-D) (13-B) (13-F) (13-G)
D61
D62
D63
D64
C61
C62
C63
C64
(12-B)
(12-C)
(12-C)
(12-D)
(12-D)
(12-E)
(12-E)
(12-G)
RC61
RC62
C65
C66
C67
M61
+12V
+5V
0V
-5V
(2-C)
(2-C)
R805
C814
RC1
R810
C810
R811
C811
JW4
Q1
Q2
L1
D1
D2
D4
C1
C2
C3
C4
C5
R1
R2
R3
R4
R5
R6
R8
R9
ZD3
VR2
C6
R51
R52
R53
R54
C51
P151
M51
(5-C)
(5-C)
(3-H)
(3-H)
Test pin
CN12
PH-7P
(8-G)
+12V
+5V
0V
-5V
(5-E)
(5-D)
CN26
XH-9P
-5V
0V
+5V
(11-F)
+12V
Q905
Q904
Q903
Q902
Q906
Q907
R905
R904
R903
R902
R906
(11-D)
(11-D)
(11-D)
(11-D)
(11-D)
R907
C205
VR11
R204
OP1
R211
R205
C206
JW2
(2-D)
(2-D)
R208
R207
Q201
Q202
Q203
(10-E)
VR12
R206
C703
C702
C701
R702
R703
R704
C706
HIC-1
+12V
+5V
0V
-5V
C208
C201
ZD301
R232
C204
R238
R231
R229
R230
(5-G)
R202
R201
C202
D201
R205
C206
COM1 (2/4)
D3
MICRO COMPUTER
SDO
SCL
SDA
CS
OH
Defrost
Outdoor temp.
Reset(Defrost)
Starting current
AVss
TEST
Self-diagnosis1
Self-diagnosis2
Vcc
OSC1
RESET
IRQ
RO2
RO4
SDI
POR
Vss
Overheat thermistor
CN4
XH-2P
Defrost thermistor
CN5
XH-2P
R306
R310
R303
R302
R301
C704
R307
R308
R304
R305
LD304
LD301
LD302
LD303
R237
R210
Service switch
R209
(8-B)
R309
Tachomater
CN13
EI-3P
(2-D)
(2-C)
CN16
XH-2P
Reversing valve coil
VH-2P
CN2
R62
R64
R63
ZD701
Q701
PQ701
R705
R706
+12V
Inter face relay
0V
BRN
RED
GRN
Terminal board
Noise filter coil
L701
L703
C709
C708
C710
I/F GND
+12V
R233
PQ701
+5V
0V
-5V
CN26
XH-9P
FAN-HIC
M34225M2 (□:M50927)
ZD901
R908
R901
C901
R925
R909
C905
C902
C903
C904
C906
Q901
R926
C921
R910
C920
C907
C908
C909
C911
C914
C912
C915
C913
C916
R911
R912
R913
Q908
Q909
Q910
R924
R927
IC1
IC2
IC3
IC4


DC brushless motor for compressor
Power module (MP6501) (6DI15S)
U
V
W
(12-G)
(13-B)
(13-C)
(13-D)
(13-E)
(13-F)
(13-G)
+12V
+5V
R229
R230
R238
R231
R232
ZD301
C204
0V
(5-G)
(13-D)
(13-D)
(13-C)
C104
C105
C106
R101
R102
R103
C101
C103
C102
R106
R105
R104
COM1
-5V
D3
MICRO COMPUTER
Reversing valve select
Heat
Cool
2 Way-valve
FANC
FANB
FANA
Inrush current
Reversing valve
Stick relay
Power relay
Driver 1
R217
R218
R219
R220
R221
R213
R216
R214
R222
(4-E)
(5-E)
R236
R215
Inrush current protection relay
Stick relay
Power relay
(2-E)
R223
R224
R225
R226
R227
R228
(4-D)
(2-D)
CN14 XH-8P
(7-B)
(11-B)
(8-B)
(5-B)
PQ501
PQ502
PQ503
PQ601
PQ602
PQ603
R501
R504
R507
C504
D501 D502
C501
R502
R505
R508
C505
D503 D504
C502
R503
R506
R509
C506
D505 D506
C503
R601
R604
R602
R605
R603
R606
R607
D601 D602
C601
CN15 XH-4P
Driver 1
Fuse (2A)
(9-K)
C907
C908
C909
C911
C914
C912
C915
C913
C916
R914
R911
R915
R912
R916
R913
Q908
Q909
Q910
R918
R920
R922
R924
C917
D901
C918
D902
C919
D903
D904
D905
D906
M
DC Fan motor
CN24 VH-3P
Driver 2
R917
(8-H)
(6-A)
CN25 XH-2P
IC2
IC4
R927
R910
C920

PRINTED WIRING BOARD LOCATION DIAGRAM

MODEL RAS-25CNH1



CONTROL (MAIN) P.W.B.

熱交サーミスタ：HEAT EXCHANGER THERMISTOR

発振子：OSCILLATOR

20↔15A切換：20／15A SELECT

応急運転：TEMPORARY SWITCH

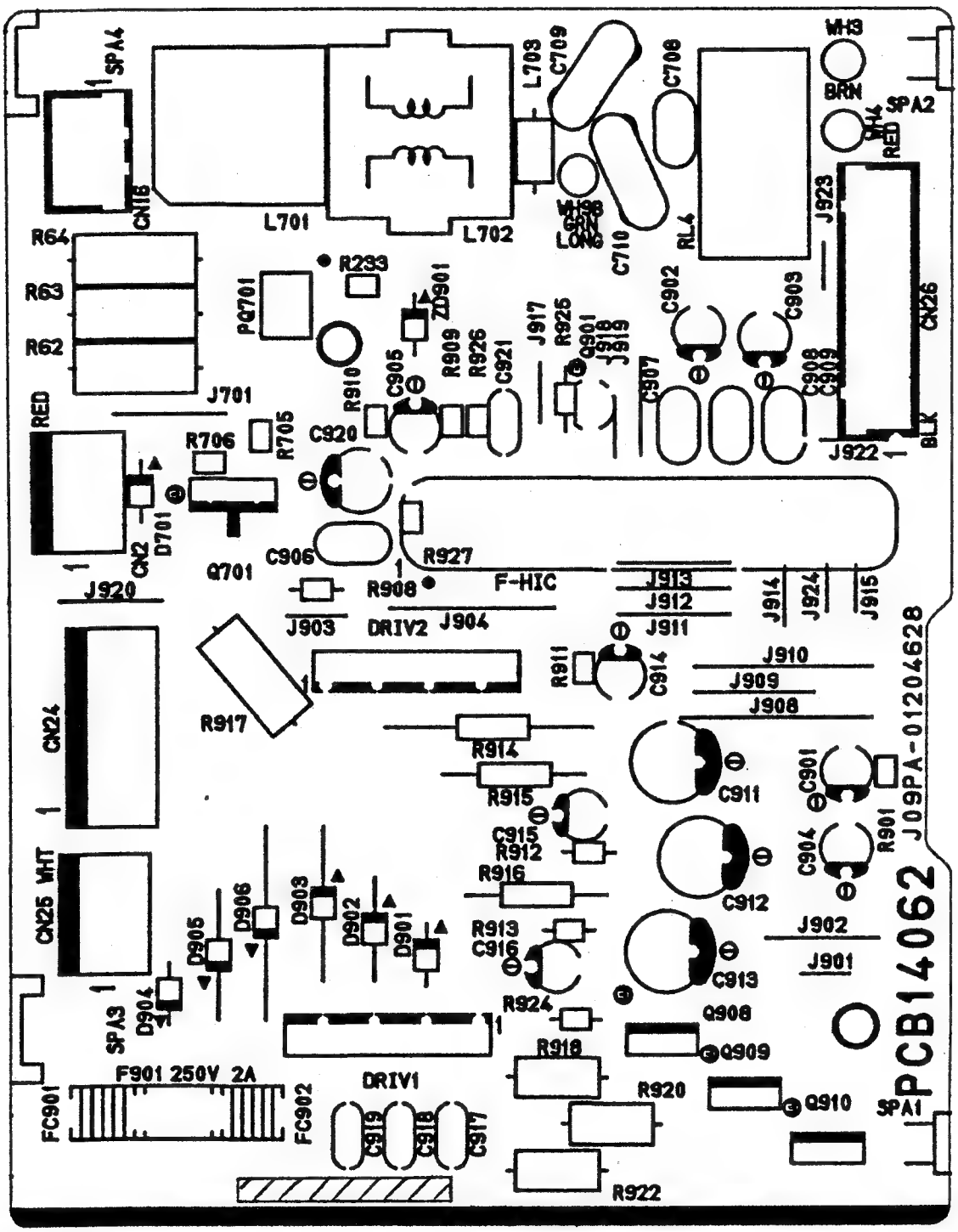
室温サーミスタ：ROOM TEMPERATURE THERMISTOR

赤：RED

黒：BLK

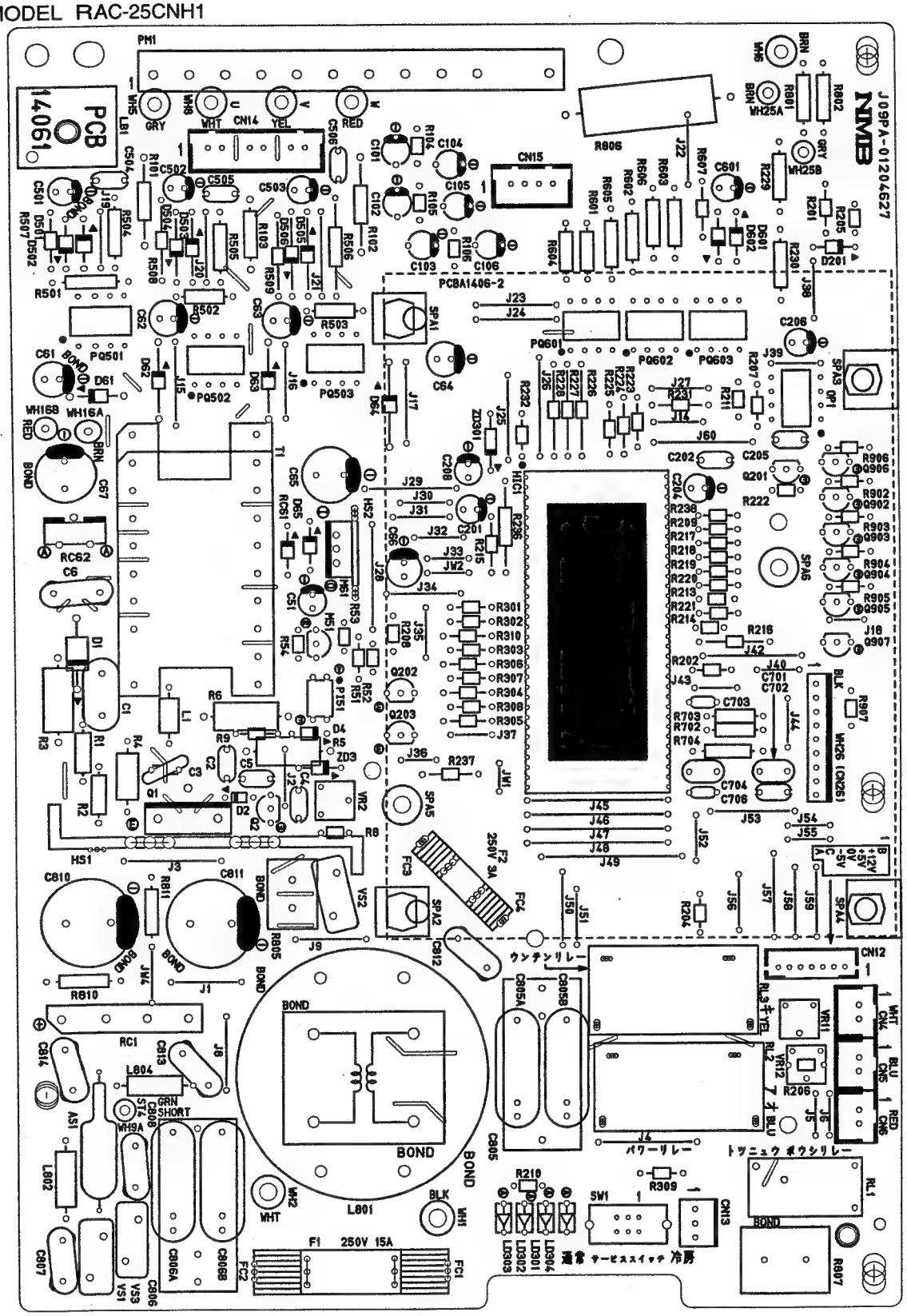
茶：BRN

MODEL RAC-25CNH1



FAN MOTOR CONTROL P.W.B.

MODEL RAC-25CNH1



ウンテンリレー：STICK RELAY

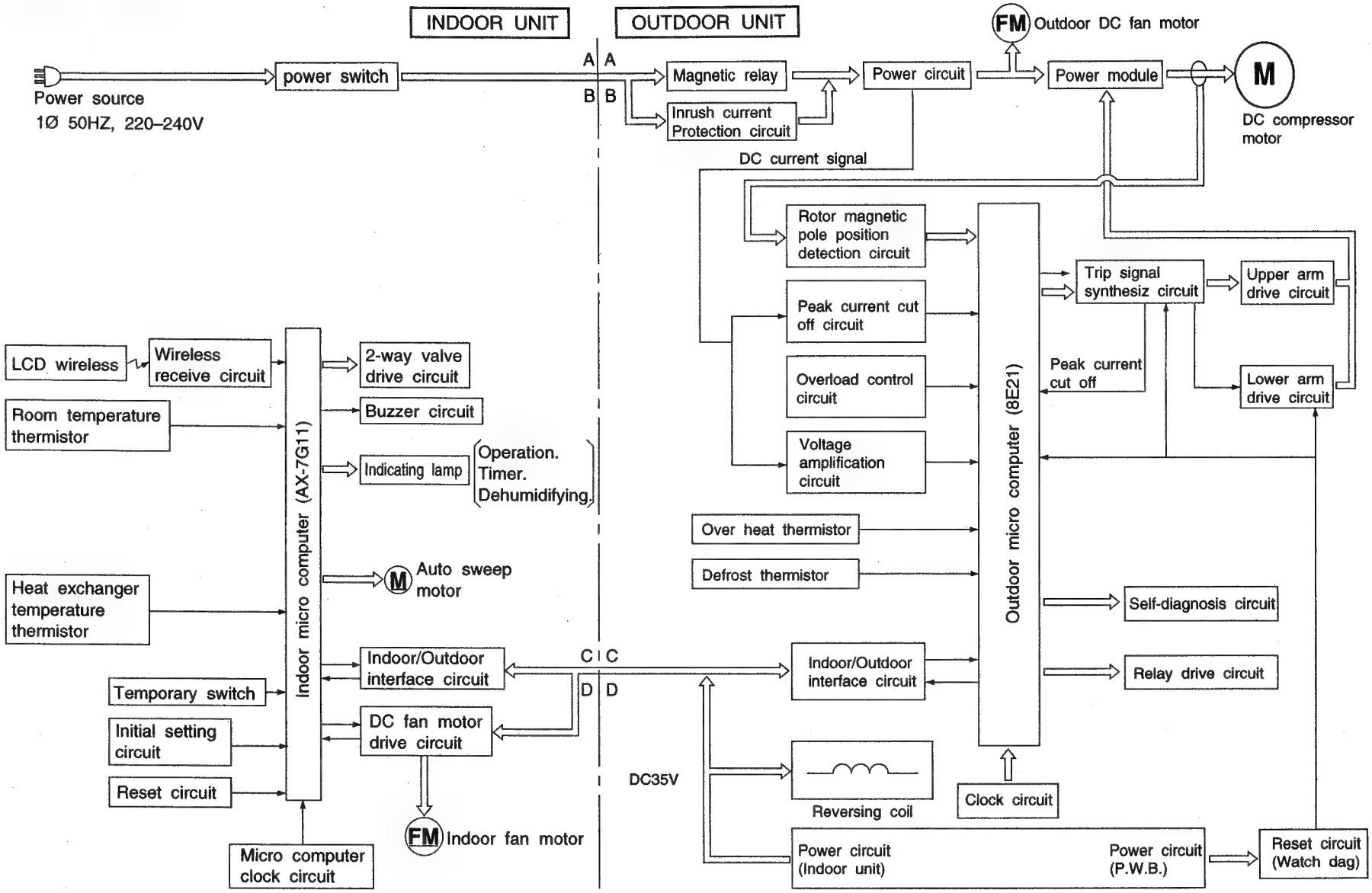
パワーリレー：POWER RELAY

トツニュウボウシリレー：INRUSH CURRENT PROTECTION RELAY

通常サービススイッチ冷房：NORMAL SERVICE SWITCH COOL

BLOCK DIAGRAM

MODEL RAS-25CNH1/RAC-25CNH1



BASIC MODE

MODEL RAS-25CNH1

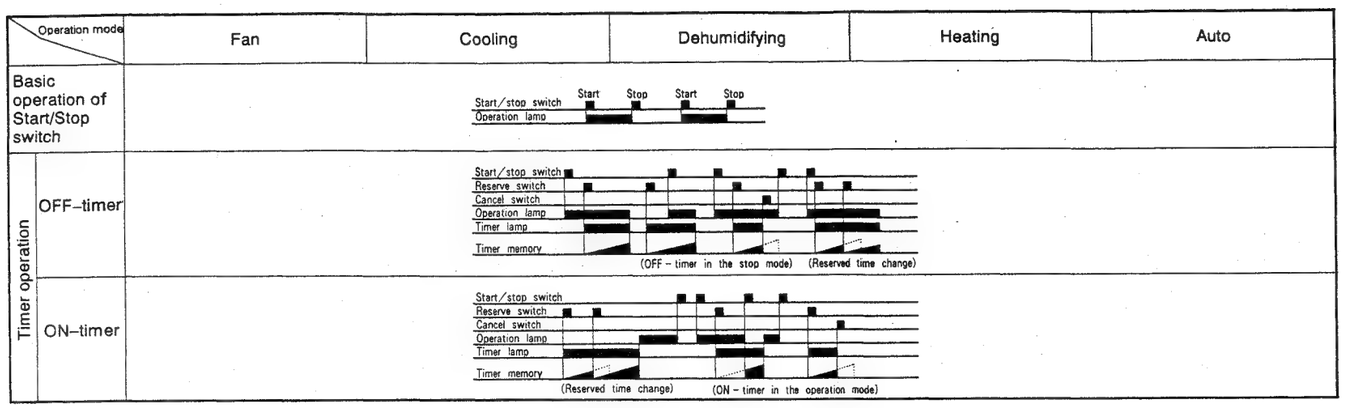


Table 3 Room temp. shift value

Operation mode		Shift value
Heating	Normal	SHIFTW
Cooling, dehumidifying	Normal	SHIFTC
	Cool Rhythm	SFTRZM

Table 2 Fan voltage by mode

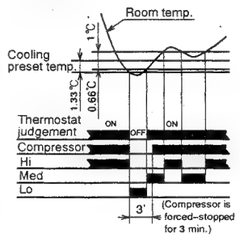
Operation mode	Fan speed tap	Label name	Voltage set value
Heating	Super Lo	AFWSS	8.8V
	Lo	AFWSSZ	16.4V
	Overload	AFWKAF	18.4V
	Med	AFWL	20.9V
	Hi	AFWH	27.1V
	Super Hi	AFWHH	35.0V
Cooling	Lo	AFCSSZ	14.3V
	Med	AFCL	16.6V
	Hi	AFCH	18.5V
	Super Hi	AFCHH	18.5V
Dehumidifying	Lo	AFDSSZ	14.3V
	Med	AFDL	16.4V
	Hi	AFDH	21.7V

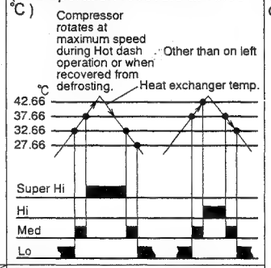
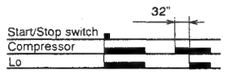
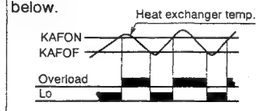
Note:

1. Refer to data in Table 1 and 2 for constants shown by capital letters in Table 3.

Table 1

Data \ Model		RAS-25CNH1
Source file name	Label name	Required value of unit side
MODDT (Mode data file)	WMAX	5500 min^{-1}
	WSTD	4650 min^{-1}
	YBCOMP	1800 min^{-1}
	CMAX	3950 min^{-1}
	CSTD	3950 min^{-1}
	CKYMAX	3950 min^{-1}
	CJKMAX	3250 min^{-1}
	COYMAX	2700 min^{-1}
	SYCLD4	3000 min^{-1}
	SYCLD3	1800 min^{-1}
	SYCLD2	1800 min^{-1}
	SYCLD1	1800 min^{-1}
	SGMNRP	1800 min^{-1}
	M8WMAX	6600 min^{-1}
	M8WSTD	5550 min^{-1}
	M8CMAX	4950 min^{-1}
	M8CSTD	4350 min^{-1}
	M8MNRP	1500 min^{-1}
	SHIFTW	4.66 ℃
	SFTHMR	Heating shift amount + 2 ℃
	SHIFTC	3.66 ℃
	SFTRZM	3.66 ℃
	YNEOF	24 ℃
	TEION	5 ℃
	TEIOF	9 ℃
	TDSFNP	5 ℃
	THONCR	0: Prohibited 180 sec: Permitted
	SFTRST	1.33 ℃
	CLMXTP	30 ℃
	SFCMIN	25 ℃
	RSTDRV	0 sec.
	DFTIM	40 min.
	TDF411	0 sec.
	TDF412	Above value + 37 sec.
	TDF413	Above value + 57 sec.
	TDF421	60 sec.
	TDF422	3900 min^{-1}
	TDF431	60 sec.
	T1	2 ℃
	T11	720 sec.
	SITUA	0.3
	SITUB	5.66 ℃
	GFSTM1	90 sec.
	GFSTM2	60 sec.
	THDMAX	120 min.
	SFTDSW	0 ℃
	KAFON	53 ℃
	KAFOF	47 ℃
	HMRTMW	330 sec.
	HMRTMC	0 sec.
	HMRTHM	1 ℃

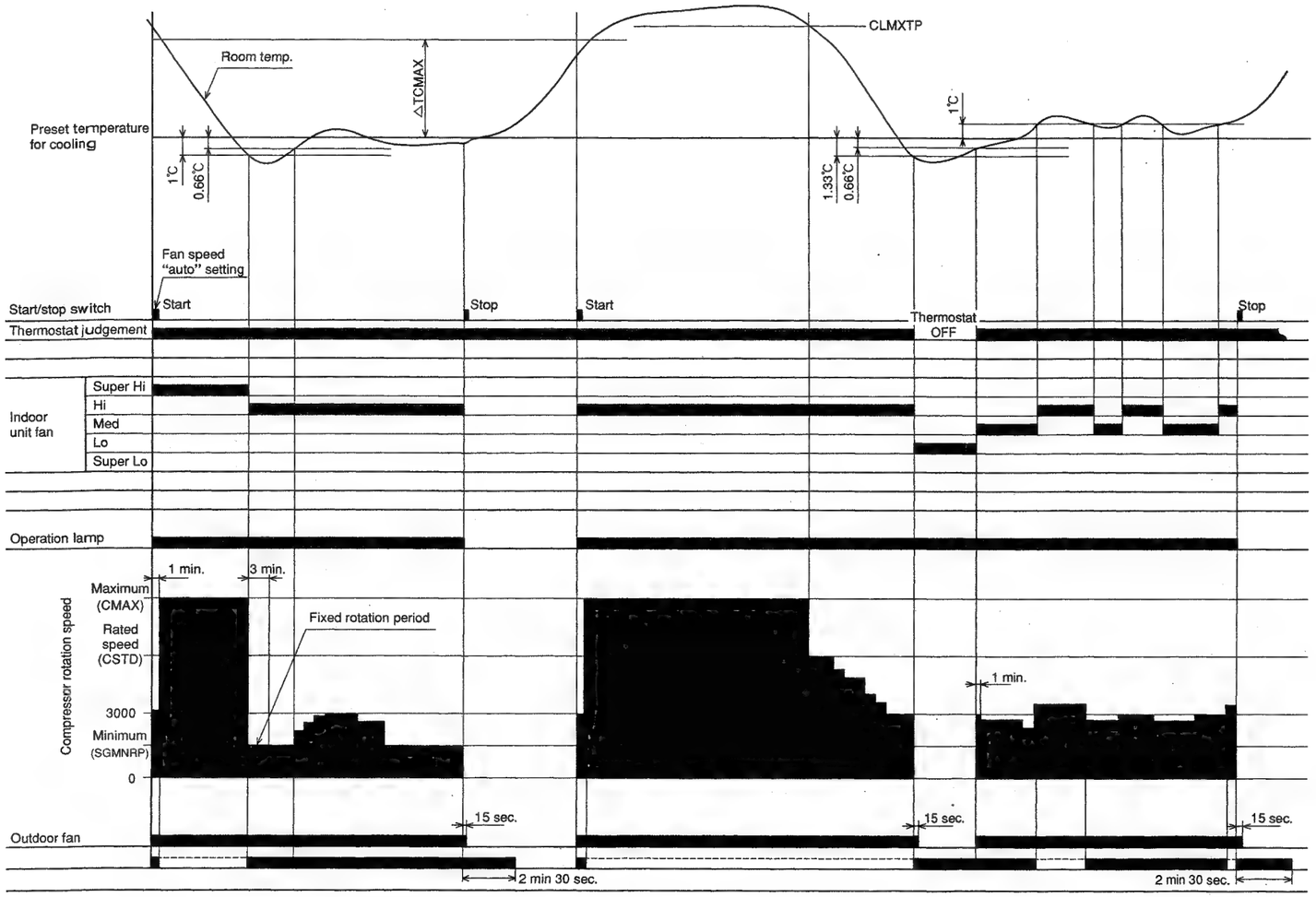
<table>
<tr><th colspan="2">Operation mode</th><th>Cooling</th><th>Dehumidifying</th><th>Heating</th><th>Auto</th></tr>
<tr><td rowspan="4">Fan speed mode (indoor unit)</td><td>Auto</td><td>Changes to "Med" or "Lo" from "Hi" according to the room temperature.
 

1.Operation continues in "Hi" mode until the thermostat turns off for the 1st time.("Super Hi" is set during Cool dash operation with the compressor rotating at maximum speed.)
2.Operates in "Lo" mode when the thermostat is OFF.</td><td></td><td>Operation mode is changed to one of "Super Lo", "Lo", "Med", "Hi", "Super Hi" and "Stop" according to the room temperature, time and heat exchanger temperature.
When the heat exchanger temperature becomes 18 ℃ or less except for the preheating operation mode, "Stop" is set.
(The operation recovers at 18.66 ℃)
 
</td><td>The following operation mode is set depending on the room temperature when the operation is started.
However, in the auto cooling mode, the Cool rhythm operation starts when the room temperature becomes the preset temperature + 0.66 ℃ after the Dash operation is completed.
Room temp. at start of operation (℃)
Cooling: Preset temperature for cooling : 27 ℃ / Fan speed made : AUTO
Dehumidifying: Preset temperature for dehumidifying : (Room temp. at operation start)–2 ℃ / Fan speed mode : Lo
Heating: Preset temperature for heating : 23 ℃ / Fan speed mode : AUTO
Note
(1) Mode is not changed after the operation is started.
(2) The preset temperature can be changed within ± 3 ℃ using the room temp. control button "∧" "∨".For example, if the preset temperature for cooling is increased by +2 ℃ to change it to 29 ℃ , the preset temperature for heating is also changed to 25 ℃ .
Also the operation mode selected from the room temperature at the start of operation is judged based on the changed value.</td></tr>
<tr><td>Hi</td><td>"Super Hi" mode operation is done during Cool dash operation with the compressor rotating at maximum speed, and "Hi" mode operation is done in other modes.</td><td></td><td>Operation mode is changed to one of "Lo", "Med", "Hi", "Super Hi" and "Stop" according to the room temperature and time.
"Super Hi" operation is done when the compressor rotates at maximum speed during Hot dash operation or when recovering from defrosting.</td><td></td></tr>
<tr><td>Med.</td><td>"Med" mode operation is done regardless of the room temperature.</td><td></td><td>Operation mode is changed to one of "Lo", "Med" and "Stop" according to the room temperature and time.</td><td></td></tr>
<tr><td>Lo</td><td>"Lo" mode operation is done regardless of the room temperature.</td><td>"Lo" mode and "Stop" mode are repeated according to the compressor operation.
 
</td><td>Operation mode is changed to one of "Lo" and "Stop" according to the room temperature and time.
The fan speed is controlled by the heat exchanger temperature and overload control is done as shown below.
 
</td><td></td></tr>
<tr><td colspan="2">Basic mode of the temperature control</td><td>Refer to page 41.</td><td>Refer to page 45.</td><td>Refer to page 47 and 48.</td><td></td></tr>
</table>

Note:

1. Refer to data in Page 37 Table 1 and 2 for each constant shown by capital letters in the diagram.

Basic cooling operation



Note:

(1) Conditions to start Cool dash operation are as follows. When the operation starts with the "AUTO" or "Hi" fan speed or when the fan speed is changed to "Hi" during cooling operation, if the temperature difference between the room temperature with the compressor rotating at maximum speed and the preset temperature is (△TCMAX: reter to Table 1) or more, Cool dash will start.

(2) Conditions for releasing Cool dash operation (compressor maximum rotation speed period) are as follows.

① Cool dash has been continued for 25 minutes.

② The room temperature reaches the cooling preset temperature (including cooling shift value) -1℃ and then the room temperature ≧ preset temperature - 0.66℃ is reachad after the fixed rotation period has elapsed.

③ The thermostat is turned OFF.

(When Cool dash is released by above ①, PI control starts without operating for fixed rotation period.)

(3) The thermostat OFF temperature during Cool dash operation is cooling preset temperature (including cooling shift value) +3℃, and after the thermostat is turned OFF, Cool dash is finished and PI control starts.

(4) The minimum ON time of the compressor is 3 minutes, and minimum OFF time is also 3 minutes.

(5) The compressor speed in the fixed rotation period after releasing Cool dash maximum speed is the minimum speed (SGMNRP).

(6) The time limit to keep the maximum speed (CMAX) of the compressor in the normal cooling operation (other than Cool dash) is within 60 minutes when the room temperature is CLMXTP or less. If the room temperature is more than CLMXTP, there is no time limit.

(7) When the fan speed setting of the remote control is "Med", the maximum compressor speed is CJKMAX.

(8) When the fan speed setting of the remote control is "Lo", the maximum compressor rotation speed is CSZMAX.

(9) When the fan speed setting of the remote control is "Hi", and both the room temperature and external temperature (data from the outdoor unit) satisfy the dewing condition shown in Table 2, the maximum compressor speed is CKYMAX. (This control is effective only when external temperature data is provided.)

(10) Power supplying reversing valve in the cooling operation mode shuts off power when the rotation speed of compressor exceeds 3100min^{-1}, and turns power on again when the speed of compressor drops below 2700 min^{-1}. (Reversing valve is hold by differential pressure of refrigerant during the power shut off.)

Table 1 △TCMAX

Max. speed (CMAX) − Min. speed (SGMNRP)	Room temp. − Preset temp. (including shift)
1000min^{-1}	1.66℃
1400min^{-1}	2.00℃
1800min^{-1}	2.33℃
2200min^{-1}	2.66℃
2600min^{-1}	3.00℃
3000min^{-1}	3.33℃
3400min^{-1}	3.66℃
3800min^{-1}	4.00℃
4200min^{-1}	4.33℃
4600min^{-1}	4.66℃
5000min^{-1}	5.00℃
5400min^{-1}	5.33℃
5800min^{-1}	5.66℃
6200min^{-1}	6.00℃
6600min^{-1}	6.33℃
7000min^{-1}	6.66℃

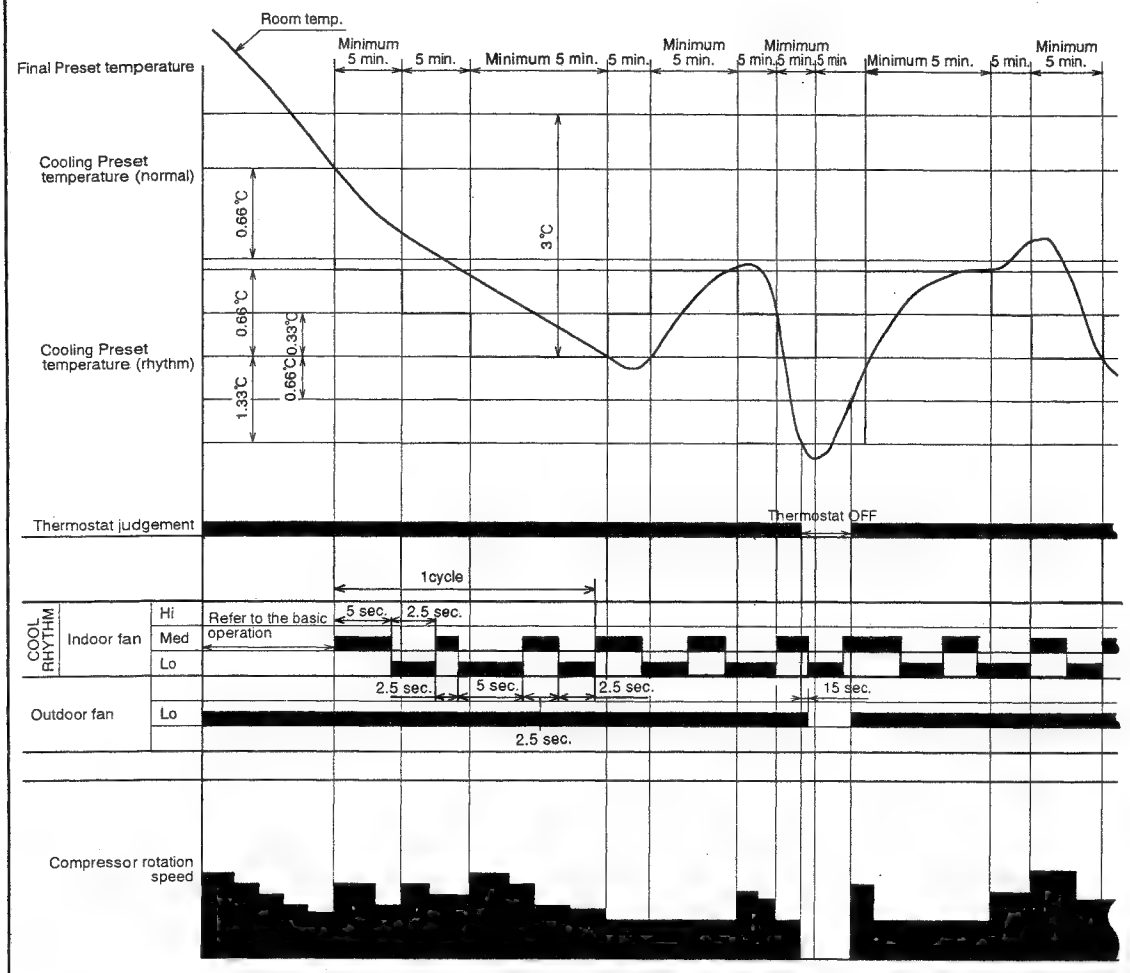
Table 2 Dewing condition judgement value

Item		Temperature
Room temp.	Dewing condition (ON)	30℃
	Dewing condition (OFF)	32℃
External temp.	Dewing condition (ON)	32℃
	Dewing condition (OFF)	34℃

Note:

1. Refer to data in page37 Table 1 for each constant shown by capital letters in the diagram.

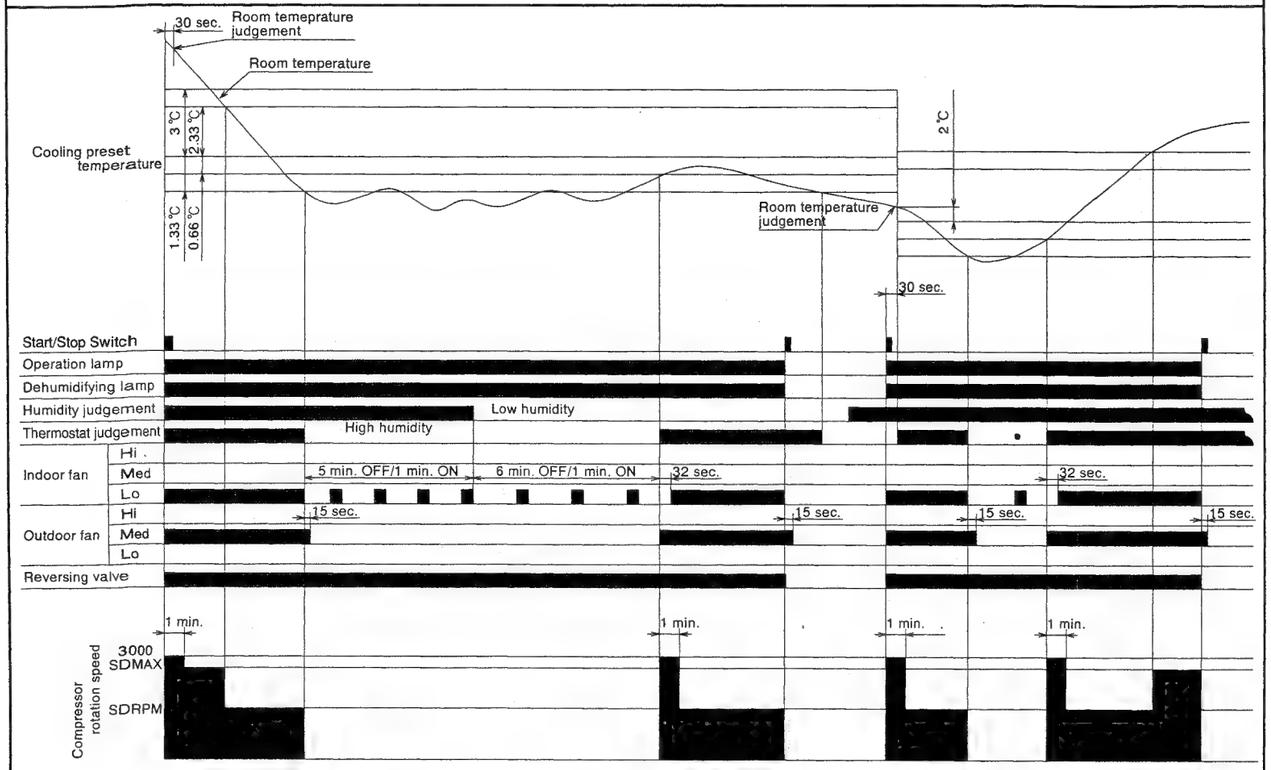
COOL RHYTHM



Note:

(1) Cool rhythm operation starts during the cooling operation in the AUTO operation mode, not during Cool dash, and when the room temperature is the preset temperature +0.66℃ or less.
(2) In Cool rhythm operation, the temperature rising period is 10 minutes (minimum) and also temperature falling period is 10 minutes (minimum).
(3) The Cool rhythm operation is not done during Nice temperature, Sleep and Cool dash operations.
(4) In Cool rhythm operation, PI control is done and the compressor rotation speed limit is the same as in normal operation.
(5) When the thermostat is turned OFF, the shifting of the preset temeprature in Cool rhythm operation is done.

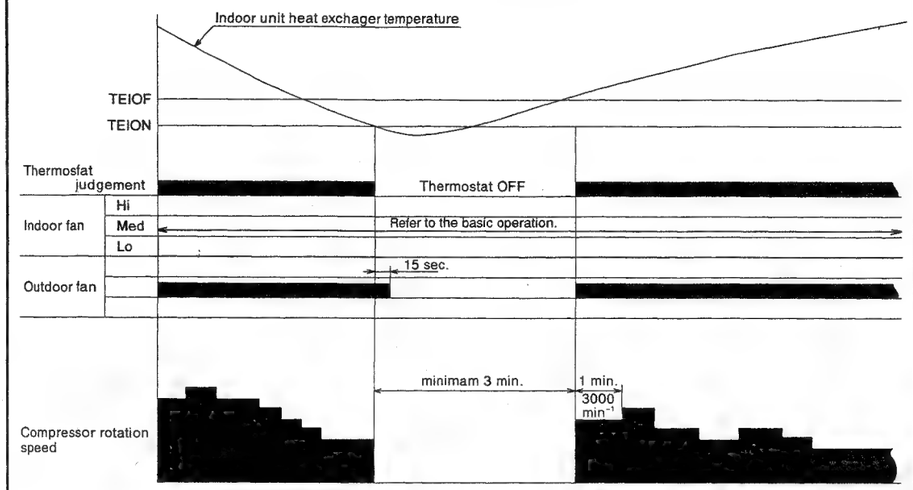
Dehumidifying



Note:

(1) 30 seconds after the operation is started, when the room temperature is (cooling preset temperature) − (1.33 ℃) or less, the operation is done assuming as the preset temperature = (room temperature at the time) − (2 ℃).
(2) The indoor fan is operated in the "Lo" mode, OFF for 5 minutes and ON for 1 minute (at high humidity) or OFF for 6 minutes and ON for 1 minute (at low humidity), repeatedly according to the humidity judgement when the thermostat is turned OFF.
(3) When the operation is started by the themostat turning ON, the start of the indoor fan is delayed 32 seconds after the start of compressor operation.
(4) The compressor is operated forcedly for 3 minutes after operation is started.
(5) The minimum ON time and OFF time of the compressor are 3 minutes.

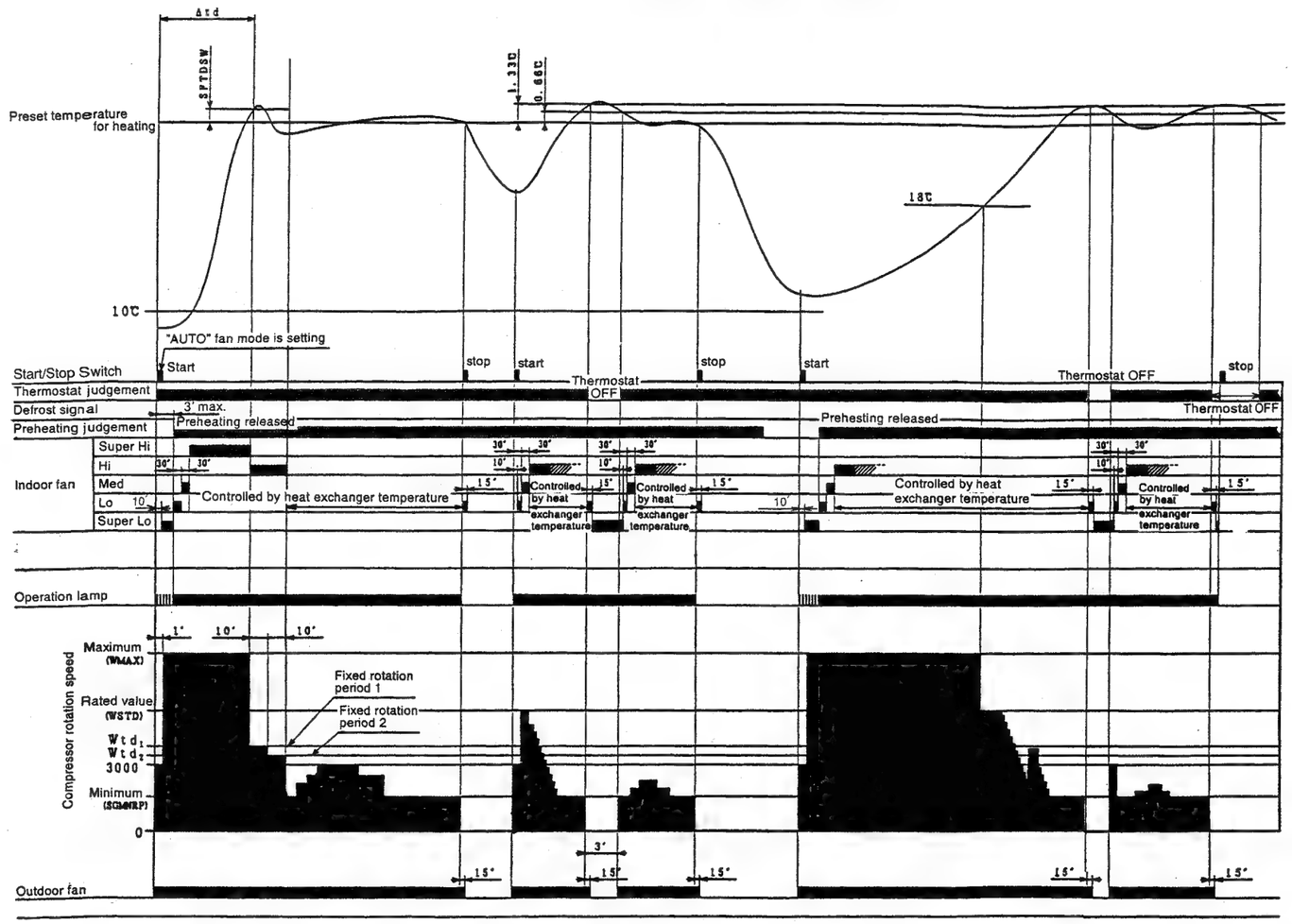
Cooling defrost



Note: (1) Compressor stop time is 3 minutes minimum.

Note:
1. Refer be data ih page 37 Table 1 for each constant shown by capital letter in the diagram.

Basic heating operation



Note:

(1) Conditions for starting Hot dash operation are as follows. When the operation starts from the "AUTO" or "Hi" fan speed or when the fan speed is changed to "Hi" during heating operation, if the temperature difference between the room temperature with the compressor rotating at maximum speed and the set temperature is (△TWMAX : refer to Table 3) and present room temperature is 10℃ or less, Hot dash will start.

(2) Conditions for releasing Hot dash operation (compressor maximum rotation speed period) are as follows.

① The limit time (THDMAX) for compressor maximum speed operation is exceeded.

② The room temperature reaches the heating preset temperature (including heating shift value)+SFTDSW.

③ The thermostat is turned OFF. (When Hot dash is released by above ①, PI control starts without operating fixed speed periods 1 and 2.)

(3) The thermostat OFF temperature during Hot dash operation is heating preset temperature (including heating shift value) + SFTDSW + 3℃, and after the thermostat is turned OFF, Hot dash is finished and the PI control starts.

(4) The minimum ON time of the compressor is 3 minutes, and minimum OFF time is also 3 minutes.

(5) The compressor speeds in the fixed speed periods 1 and 2 after releasing the Hot dash maximum rotation (Wtd1 and Wtd2) are determined as in Table 2 depending on the maximum rotation holding time (△td).

(6) The time limit to hold the maximum rotation (WMAX) of the compressor in the normal heating operation (other than Hot dash) is within 60 minutes when the room temperature is 18℃ or more. If the room temperature is less than 18℃, there is no time limit.

(7) After power is turned on, when operation is started in heating mode, initial cycle operation (cooling cycle, indoor/outdoor fan stops, indoor/outdoor 2-way valves come on) is performed for RSTDRV sec. to catch rust in refrigerating cycle using filter, after this stop operation for TDF431 sec. then, start heating operation.

(8) During initial cycle operation, preheating operation, defrosting (including balancing operation after defrosting) or AUTO-FRESH defrosting, the operation lamp will blink at intervals of one second.

(9) Preheating operation is determined as follows; preheating comes on when heat exchanger temperature < YNEOF - 0.66℃ when operation is started with start / stop switch ; preheating mode is released when heat exchanger temperature > YNEOF.

(10) Rotation speed of compressor is limited to the value of Rating for Heating (WSTD) + 2000 / 2 min⁻¹ or less in "Low" fan operation mode.

(11) In "Super Low" fan operation mode, when room tenperature drops below 18℃, indoor fan operation will stop. When room temperature reaches 18℃ + 0.66℃, Super Low fan operation will start again. However during preheating or preheating after defrosting, Super Low fan operation will not stop even if room temperature drops below 18℃.

Note:

1. Refer ti data in Table 1 in page 37 for each constant shown by capital letters in the diagram.
2. ['] means minute and ["] means second (ex. 30', 15") in the diagram.

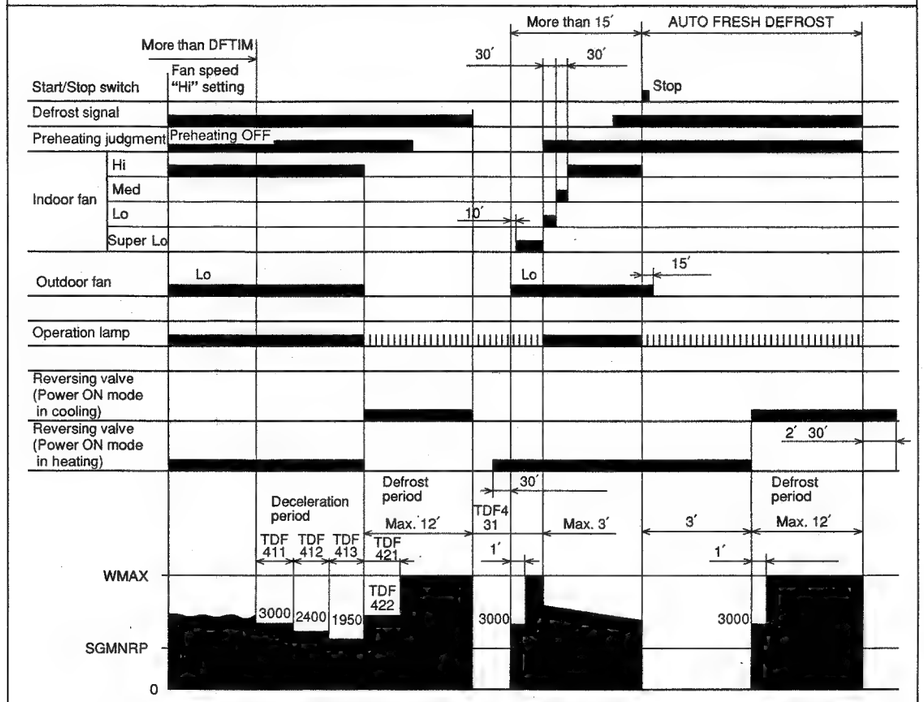
Table 1 Speed specification during fixed rotation period

△td (Hot dash time)	Wtd_1	Wtd_2
Less than 10 minutes	2000min⁻¹	1600min⁻¹
10 minutes to less than 20 minutes	3000min⁻¹	2400min⁻¹
20 minutes or more	4000min⁻¹	3200min⁻¹

Table 2 △TCMAX

Max. speed (WMAX) — Min. speed (SGMNRP)	Preset temp. (inculding shift) — Room temp.
1000min⁻¹	1.66℃
1400min⁻¹	2.00℃
1800min⁻¹	2.33℃
2200min⁻¹	2.66℃
2600min⁻¹	3.00℃
3000min⁻¹	3.33℃
3400min⁻¹	3.66℃
3800min⁻¹	4.00℃
4200min⁻¹	4.33℃
4600min⁻¹	4.66℃
5000min⁻¹	5.00℃
5400min⁻¹	5.33℃
5800min⁻¹	5.66℃
6200min⁻¹	6.00℃
6600min⁻¹	6.33℃
7000min⁻¹	6.66℃

Reversing valve defrost



Note:

(1) The DEFROST inhibit period is DFTIM. After DEFROST is completed, defrost signal is not accepted for DFTIM. However, first inhibit period is fixed at 40 minutes.

(2) If the temperature difference between the room temperature and set temperature is great after the DEFROST is completed, compressor can keep maximum rotation speed (WMAX) for up to 120 minuets.

(3) DEFROST period is a maximum 12 minutes.

(4) When operation is stopped during DEFROST, the mode switches to AUTO FRESH DEFROST.

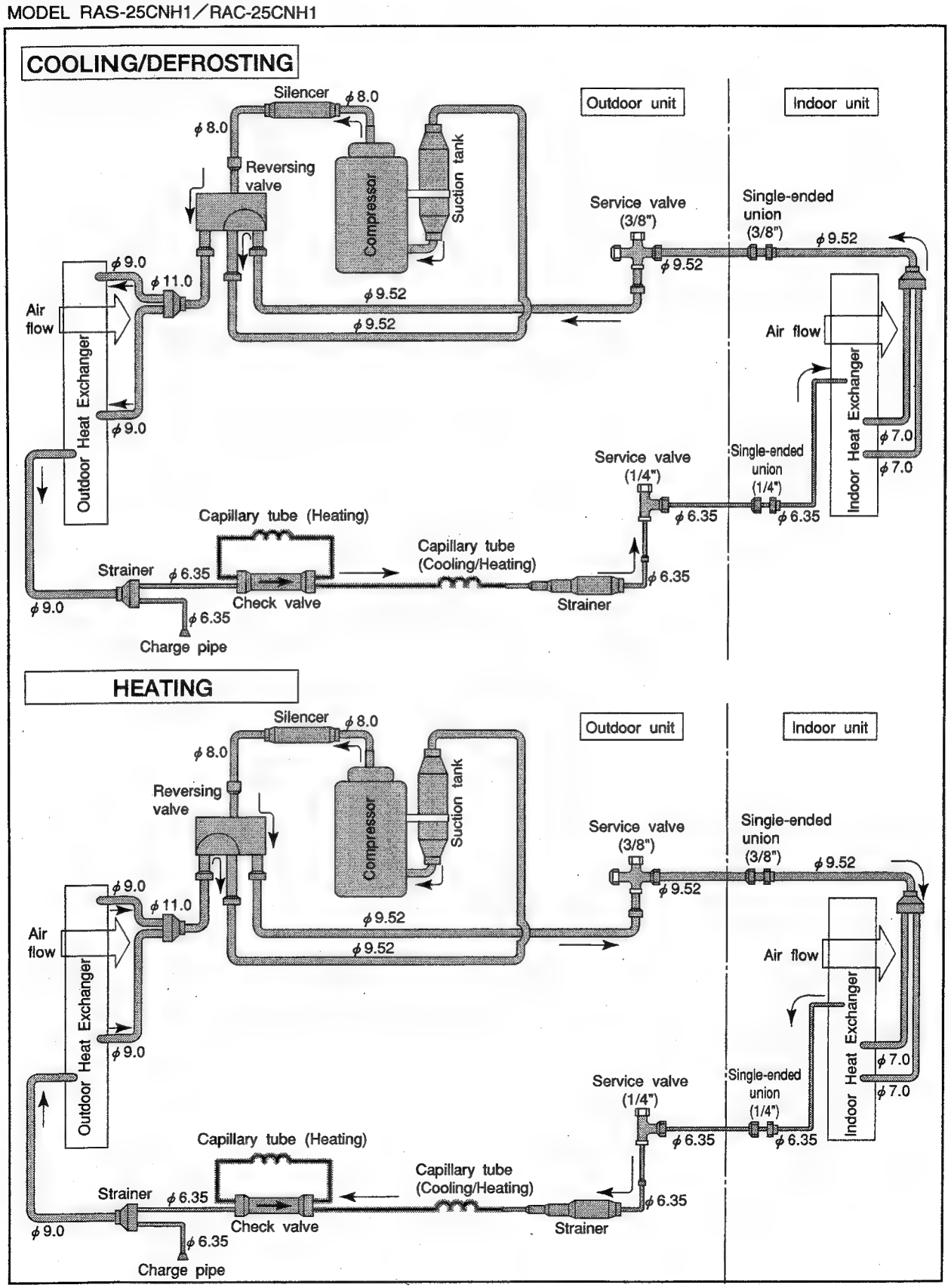
(5) AUTO FRESH DEFROST does not work within 15 minutes after the operation is started or after DEFROST is completed.

Note:

1. Refer to data in Table 1 on page 37 for each constant shown in capital letters in the diagram.
2. In the diagram, O' attached to the top right of number means minute, O" means second. (ex. 30', 15")

REFRIGERATING CYCLE DIAGRAM

MODEL RAS-25CNH1／RAC-25CNH1



AUTO SWING FUNCTION

INPUT SIGNAL	PRESENT CONDITION			OPERATING SPECIFICATION	REFERENCE
	OPERATION	OPERATION MODE	AIR DEFLECTOR		
KEY INPUT	STOP	EACH MODE	STOP	ONE SWING (CLOSING AIR DEFLECTOR) ① DOWNWARD ② UPWARD	INITIALIZE AT NEXT OPERATION.
			DURING ONE SWING	STOP AT THE MOMENT.	
	DURING OPERATION	AUTO COOL COOL FAN AUTO DRY DRY	STOP	START SWINGING ① DOWNWARD ② UPWARD ③ DOWNWARD	
			DURING SWINGING	STOP AT THE MOMENT.	
		AUTO HEAT HEAT CIRCULATOR	STOP	START SWINGING ① DOWNWARD ② UPWARD ③ DOWNWARD	
			DURING SWINGING	STOP AT THE MOMENT.	
THERMO. ON (INTERNAL FAN ON)	DURING OPERATION	AUTO DRY DRY AUTO HEAT HEAT CIRCULATOR	TEMPORARY STOP	START SWING AGAIN.	
THERMO. OFF (INTERNAL FAN OFF)			DURING SWINGING	STOP SWINGING TEMPORARILY. (SWING MODE IS CLEARED IF SWING COMMAND IS TRANSMITTED DURING TEMPORARY STOP.)	
MAIN SWITCH ON	STOP	COOL FAN DRY	STOP DURING ONE SWING	INITIALIZE ① DOWNWARD ② UPWARD	
		HEAT CIRCULATOR	STOP DURING ONE SWING	INITIALIZE ① DOWNWARD	
MAIN SWITCH OFF	DURING OPERATION	EACH MODE	STOP DURING SWINGING	ONE SWING (CLOSING AIR DEFLECTOR) ① DOWNWARD ② UPWARD	INITIALIZE AT NEXT OPERATION.
			DURING INITIALIZING		
CHANGE OF OPERATION	DURING OPERATION	EACH MODE	STOP	INITIALIZING CONDITION OF EACH MODE.	
			DURING SWINGING	STOP SWINGING AND MODE BECOMES INITIALIZING CONDITION.	

DESCRIPTION OF MAIN CIRCUIT OPERATION

MODEL RAS-25CNH1

1. Reset Circuit

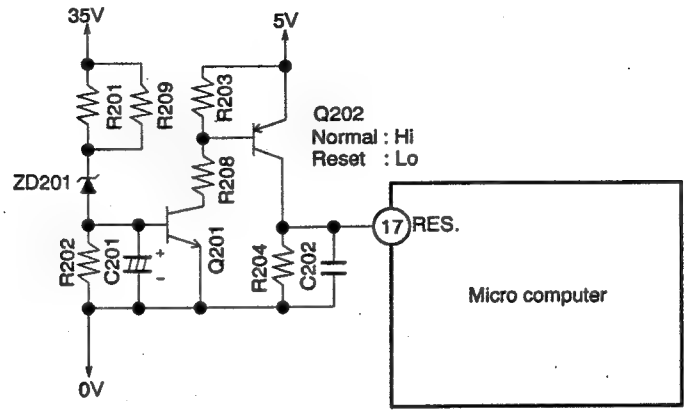


Fig. 1–1

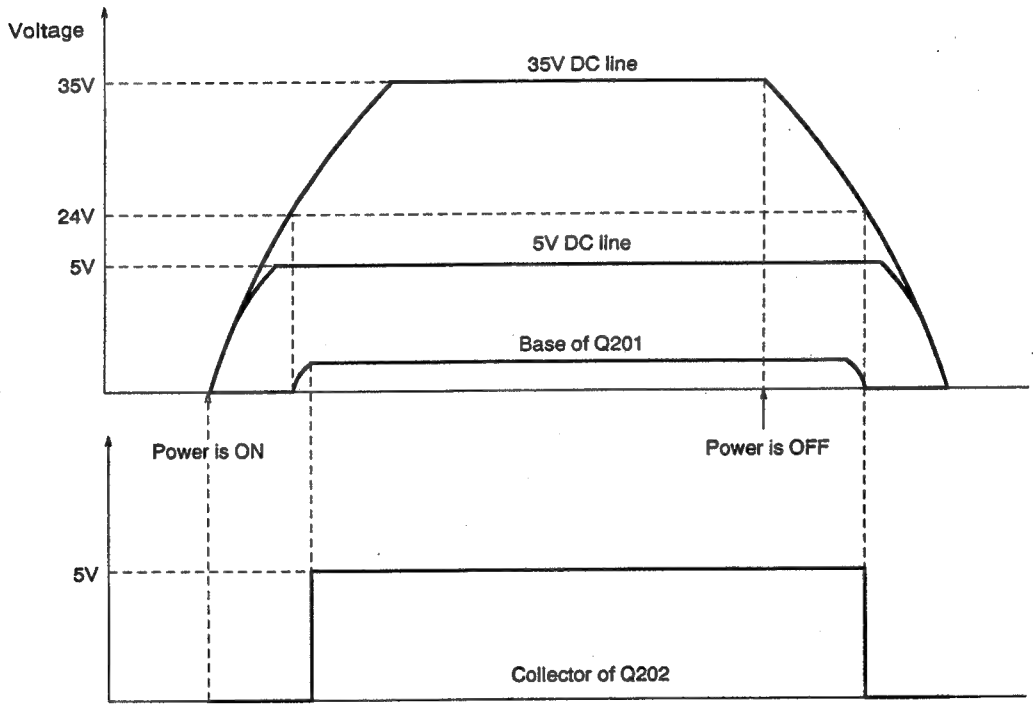
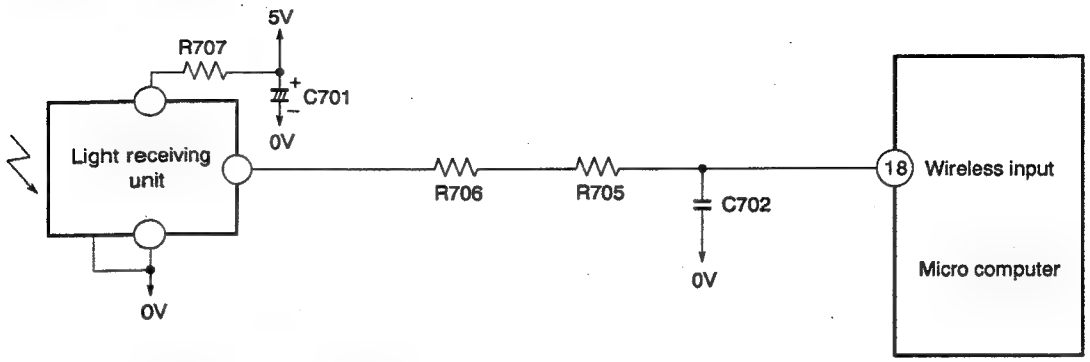


Fig. 1–2

- The reset circuit initializes the program when power is supplied or power is restored following a power failure.
- RESET "Lo" or SET "Hi" activates the micro computer.
- Fig. 1–2 shows the waveforms in each circuit when power is ON and OFF.
- When power is supplied, the voltages on the 35V and 5V DC lines rise, and when the 35V DC line becomes approx. 24V, ZD201 turns on and the voltage at the base of Q201 rises to turn Q201 on. Since the collector of Q201 goes "Lo" at this time, Q202 turns on and the reset input of the micro computer goes "Hi". The 5V DC line has already been 5V at this time and the micro computer starts operation.
- When power is OFF, the voltage on the 35V DC line drops, and when it is approx. 24V, ZD201 turns off, Q201 and Q202 turn off, and the reset input of the micro computer goes "Lo" to reset it.

2. Receive Circuit



- The Light receiving unit receives an infrared signal from the wireless remote control. The receiver amplifies and shapes the signal and outputs it.

3. Buzzer Circuit

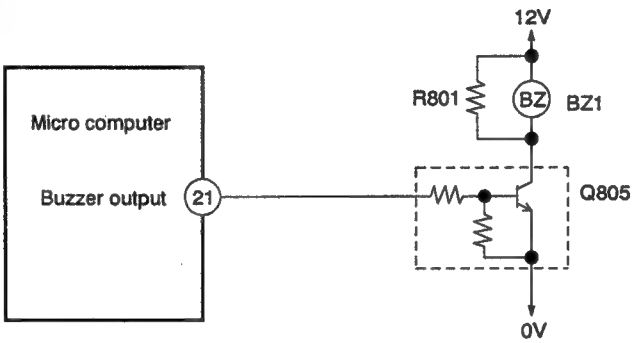


Fig. 3–1 Buzzer Circuit

- When the buzzer sounds, an approx. 3.9kHz square signal is output from buzzer output pin ㉑ of the micro computer. After the amplitude of this signal has been set to 12Vp–p by a transistor, it is applied to the buzzer. The piezoelectric element in the buzzer oscillates to generate the buzzer's sound.

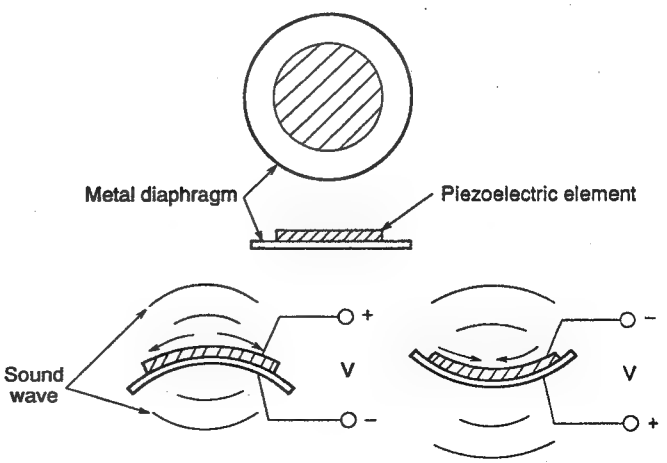


Fig. 3–2 Buzzer Operation

4. Auto Sweep Motor Circuit

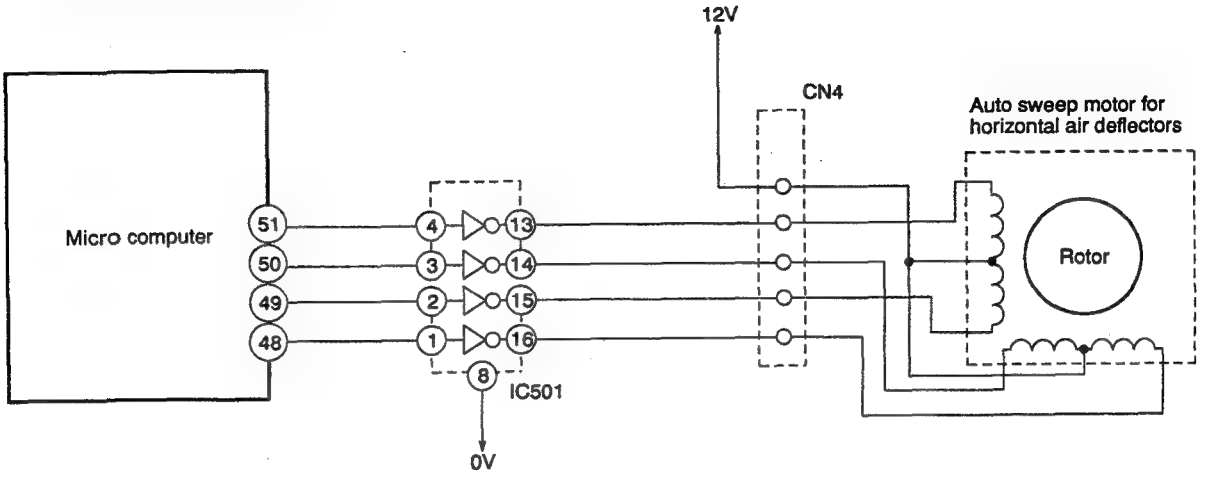


Fig. 4–1 Auto Sweep Motor Circuit (Horizontal air deflectors)

- Fig. 4–1 shows the Auto sweep motor drive circuit; the signals shown in Fig. 4–2 are output from pins ㊽ – ㊶ of the micro computer.

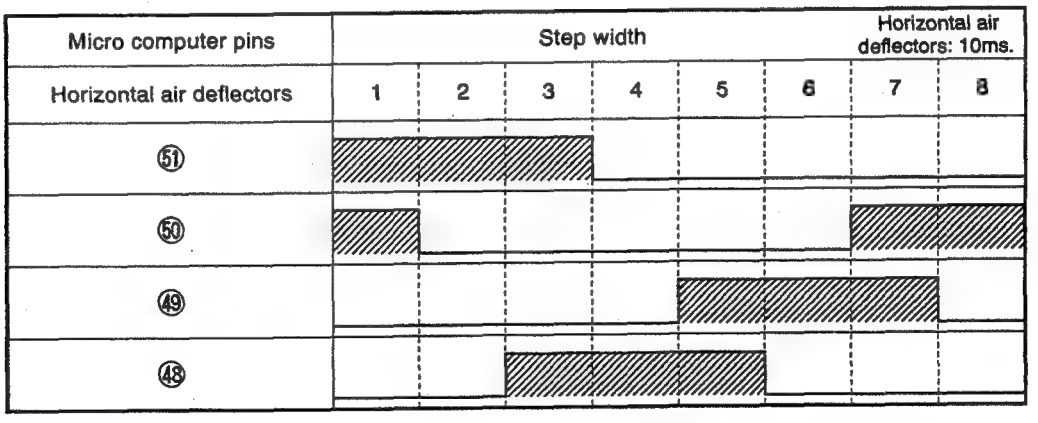


Fig. 4–2 Micro computer Output Signals

- As the micro computer's outputs change as shown in Fig. 4–2, the core of the auto sweep motor is excited to turn the rotor. Table 4–1 shows the rotation angle of horizontal air deflectors.

Table 4–1 Auto sweep Motor Rotation

	Rotation angle per step (°)	Time per step (ms.)
Horizontal air deflectors	0.0879	10

5. Room Temperature Thermistor Circuit

Fig. 5–1 shows the room temperature thermistor circuit.

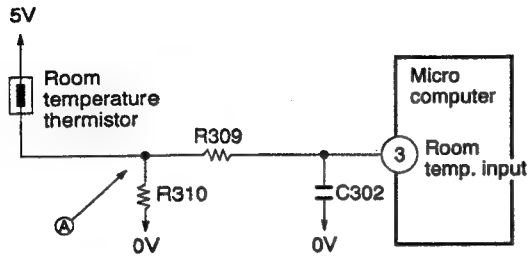


Fig. 5–1

The voltage at Ⓐ depends on the room temperature as shown in Fig. 5–2.

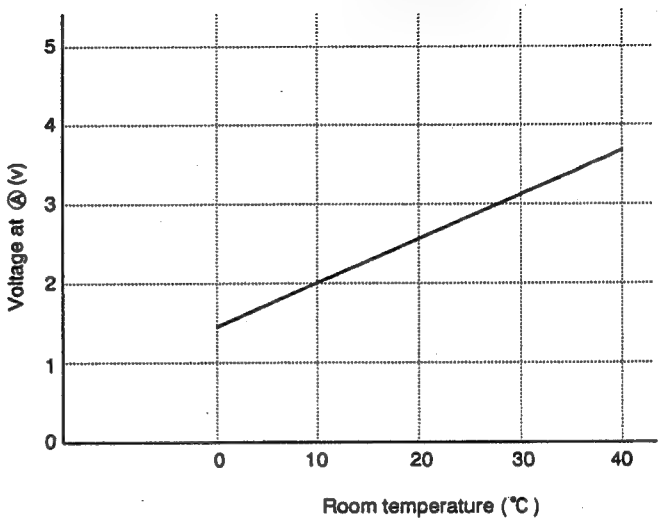


Fig. 5–2

6. Heat exchanger temperature thermistor circuit

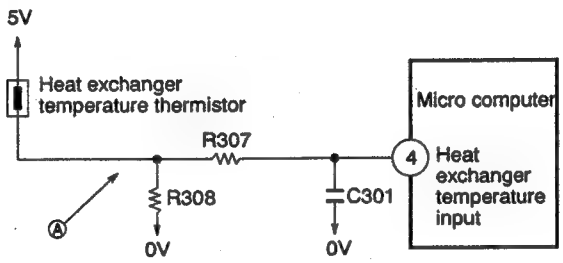


Fig. 6–1

The circuit detects the indoor heat exchanger temperature and controls the following.

(1) Preheating.
(2) Low–temperature defrosting during cooling and dehumidifying operation.
(3) Detection of the reversing valve non–operation or heat exchanger temperature thermistor open.

The voltage at Ⓐ depends on the heat exchanger temperature as shown in Fig. 6–2.

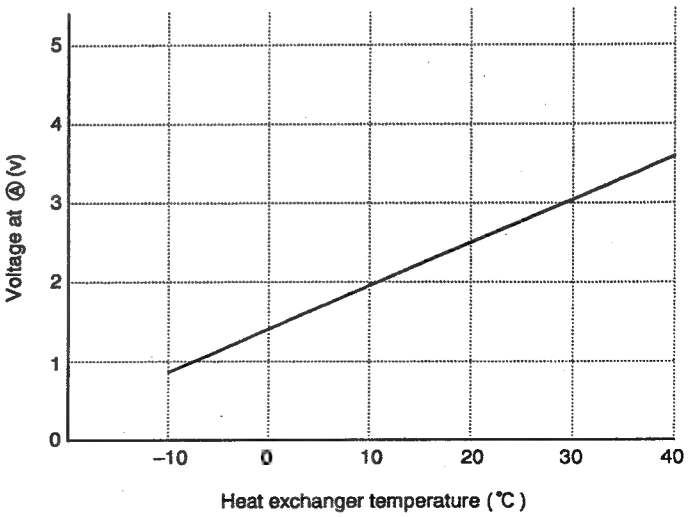


Fig. 6–2

7. Temporary Switch

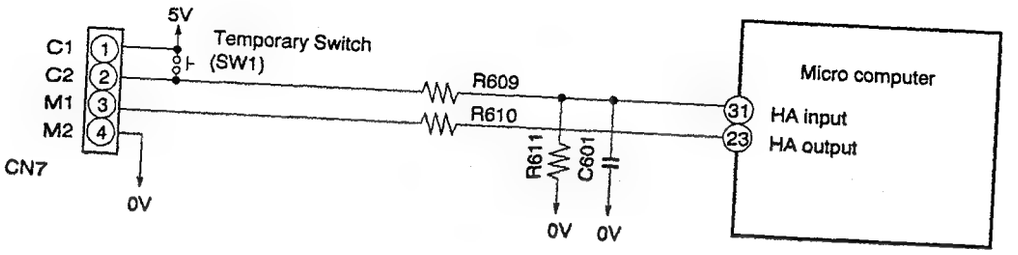


Fig. 7-1

- The temporary switch is used to operate the air conditioner temporarily when the wireless remote control is lost or faulty.
- The air conditioner operates in the previous mode at the previously set temperature. However, when the power switch is set to OFF, it starts automatic operation.

8. DC Fan Motor Drive Circuit

- Fig. 8-1 shows the indoor DC fan motor drive circuit.

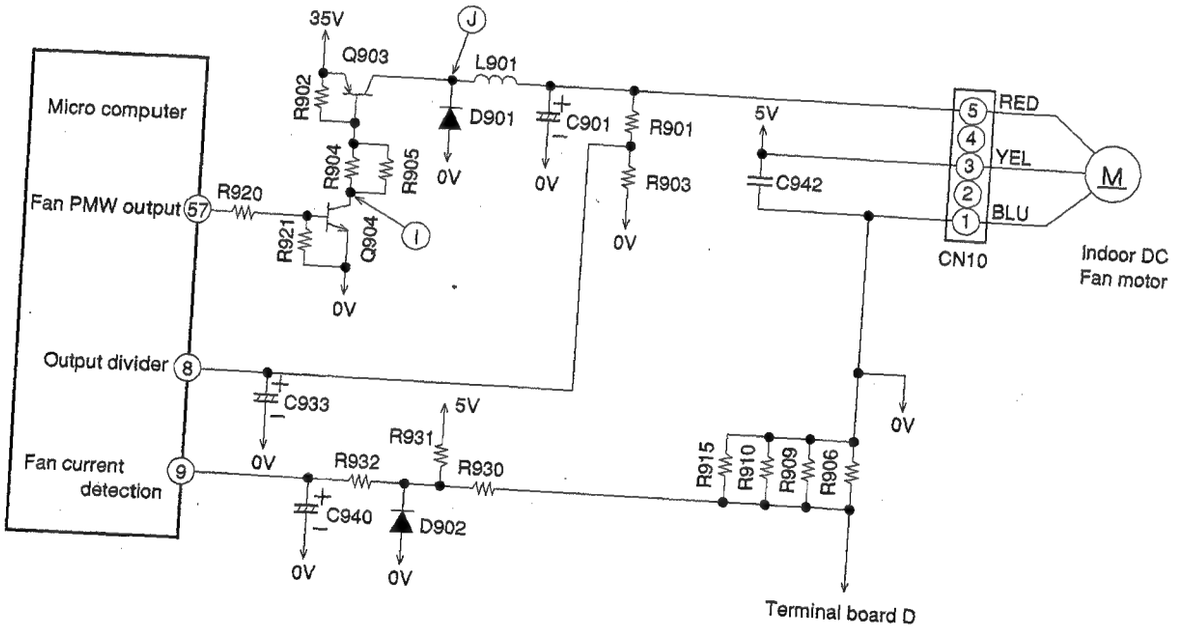


Fig. 8-1

- The circuit produces the fan motor drive voltages, 8–33V, from 35V DC supplied from the outdoor unit and controls the fan motor speed.
- Q903 is switched on and off according to the signal at fan PWM output pin ⑤⑦ to control the voltage which is smoothed by D901, L901 and C901 to drive the fan motor.
- The output voltage is divided by R901 and R903 and is input to divided voltage output pin ⑧ ; the micro computer controls the fan PWM output so the output voltage is set to the specified value. The chopper frequency of the fan PWM output is 15.7kHz.
- In the Fan current detection circuit, 35V line current is detected by R906 ~ R915 and input to fan current detection pin ⑨. Microcomputer detects overcurrent comparing it with the current judgment value corresponding to the fan rotation speed.

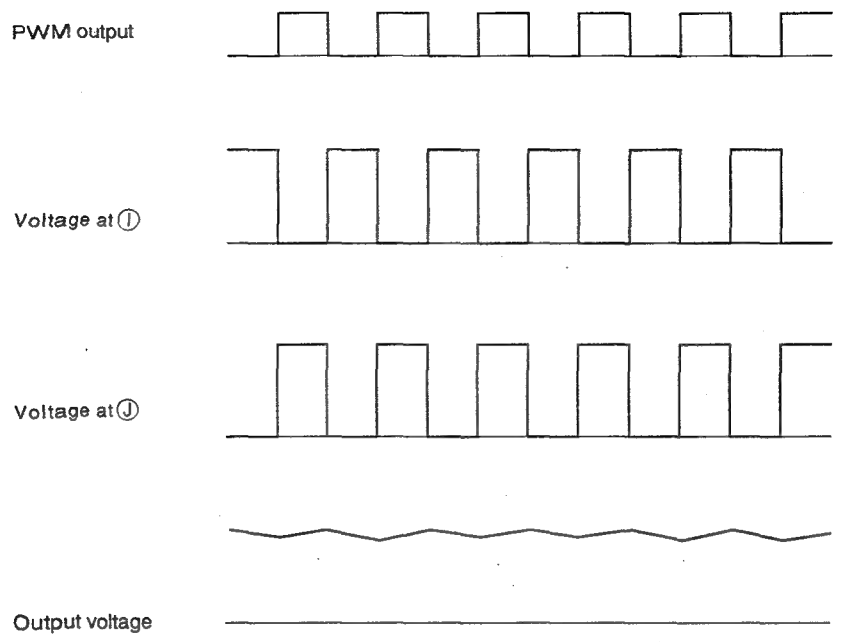


Fig. 8-2

Fan Motor Set Wind Velocity and DC Voltage (between blue and red) Characteristics

Mode		Fan speed	Connector blue-red voltage (V)	Rotation Speed (min^{-1})
Indoor fan speed	Heating	SUPER LO	8.8	500
		LO	16.4	960
		OVERLOAD	18.4	1000
		MED	20.9	1140
		HI	27.1	1350
		SUPER HI	35.0	1560
	Cooling	LO	14.3	860
		MED	16.6	970
		HI	18.5	1040
		SUPER HI	18.5	1040
	Dehumi-difying	LO	14.3	800

9. 12V Power circuit

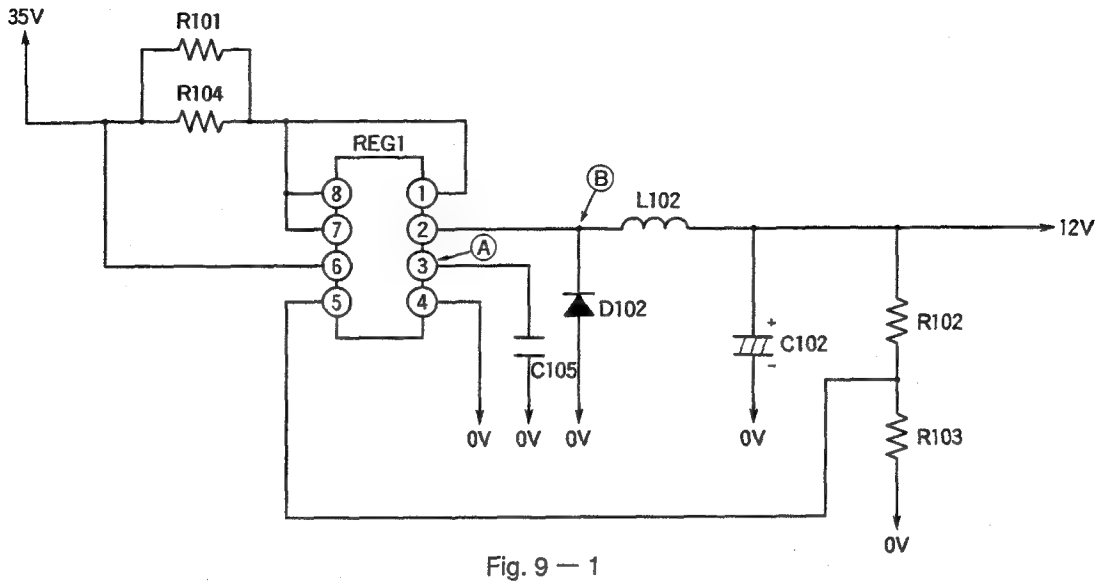


Fig. 9 — 1

- DC 35V supplied from the outdoor unit is controlled by switching of regulator 1, and is smoothed by D102, L102 and C102 to produce 12V.

- Output voltage is divided by R102 and R103, and input to output dividing pin ⑤ to control switching, so that output voltage is 12V.

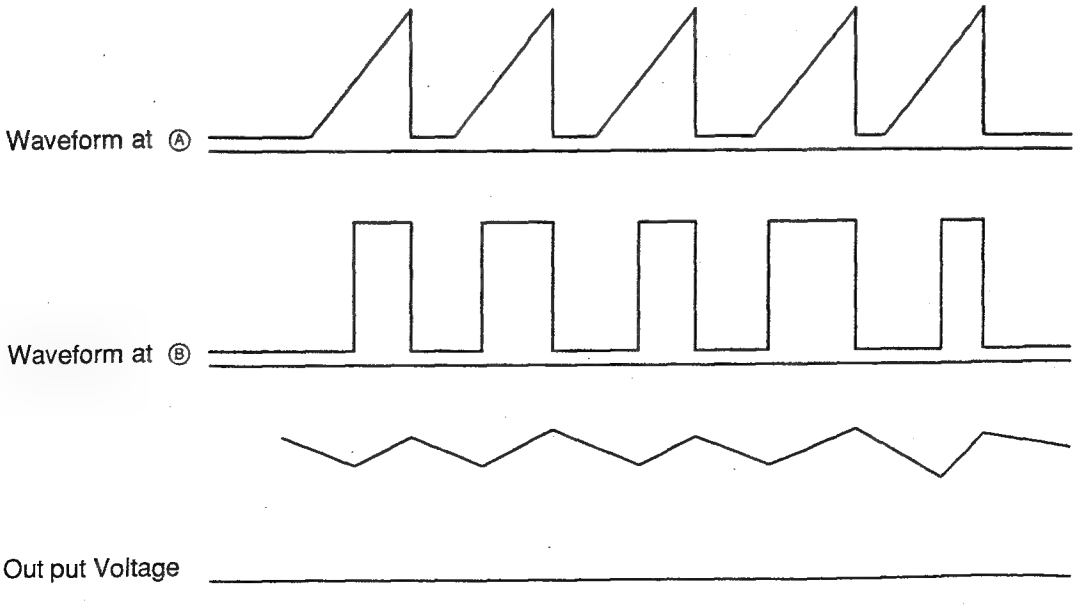


Fig. 9 — 2

MODEL RAC—25CNH1

1. Power Circuit

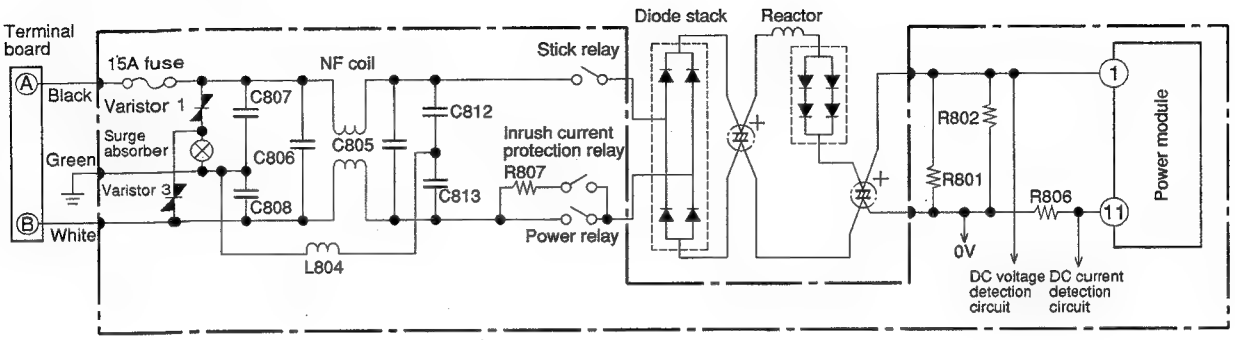


Fig. 1–1

- This circuit full-wave rectifies 220-240V AC applied between terminals A:B to produce a DC voltage of

$$220\text{-}240 \times \sqrt{2} = 310\text{-}340\text{V}$$

at the positive and negative terminals. However, the voltage is approx. 260-290V when the compressor is operating.

- The following describes the main parts components.

(1) Reactor and power capacitor

The filter consisting of a reactor and power capacitor removes high harmonics components from the current containing high harmonics occurring when the compressor is operating to improve the power factor.

〈Reference〉

- If the reactor is faulty or the connection is defective, the compressor may stop due to "abnormality in line voltage", etc. immediately after it is started.

(2) Diode stacks

These rectify the 220-240V AC from terminal boards A and B to a DC power supply.

〈Reference〉

- When diode become defective, the compressor may stop due to " abnormality in line voltage", etc. immediately after it is started or no operation may be done as a DC voltage is not generated between the positive ⊕ and negative ⊖ terminals.
- When diode stack becomes defective, check whether the 15A fuse has blown.

(3) Smoothing capacitor
This smoothes (averages) the voltage rectified by the diode stacks.

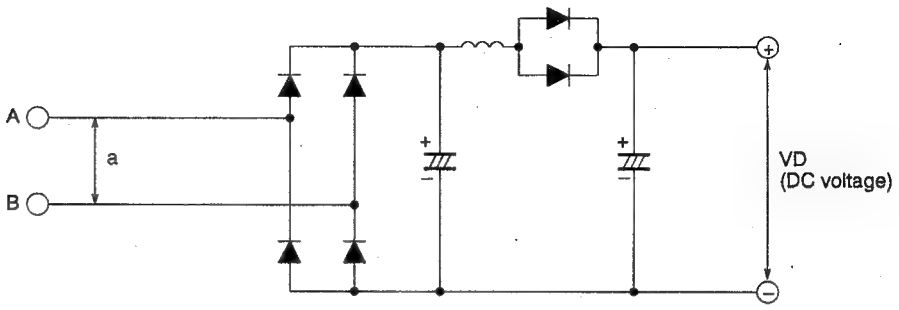


Fig. 1–2

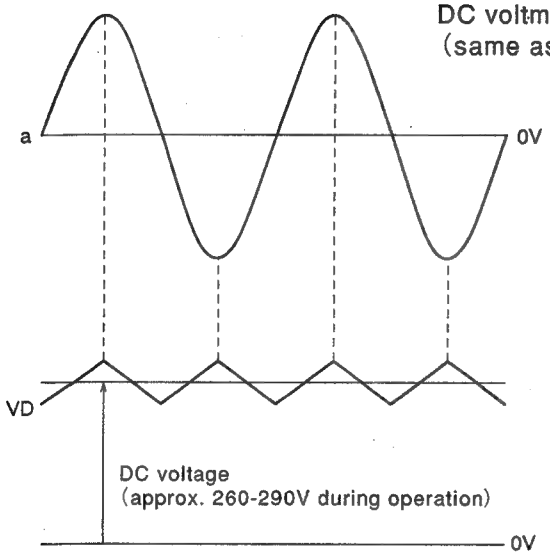


Fig. 1–3

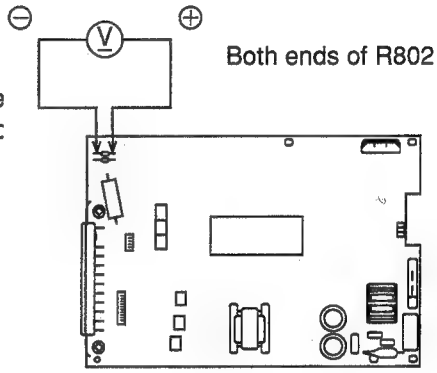


Fig. 1–4

〈Reference〉

- DC voltage can be measured by connecting both ends of R802 on the control P.W.B. using a tester, etc.
- Be careful to avoid an electric shock as a high voltage is generated. Also take care not to cause a short–circuit through incorrect connection of test equipment terminals. The circuit board could be damaged.

(4) Smoothing capacitor
This smoothes (averages) the voltage rectified by the diode stacks.
A DC voltage is generated in the same way as in Fig. 1–3.

(5) C805 - C808, C812, C813, L804 (NF coil)
These absorb electrical noise generated during operation of compressor, and also absorb external noise entering from power line to protect electronic parts.

(6) Surge absorber, varistor 1, 3
These absorbs external power surge.

(7) Inrush protective resistor (R807)
This works to protect from overcurrent when power is turned on.
R807 Short-circuit → Overcurrent flows in rush protection ON mode.
Open → Overcurrent flows with power relay turned ON. (damaged each time power relay is turned ON)
Diode stack and 15A fuse deteriorate.

〈Reference〉
When inrush protective resistor is defective, diode stack may malfunction. As a result, DC voltage is not generated and no operation can be done.

2. Indoor / Outdoor Interface Circuit

- The interface circuit superimposes an interface signal on the 35V DC line supplied from the outdoor unit to perform communications between indoor and outdoor units. This circuit consists of a transmiting circuit which superimposes an interface signal transmit from the micro computer on the 35V DC line and a transmiting circuit which detects the interface signal on the 35V DC line and outputs it to the micro computer.
- Communications are performed by mutually transmiting and receiving the 4–frame outdoor request signal one frame of which consists of a leader of approx. 100 ms., start bit, 8–bit data and stop bit and the command signal with the same format transmit from the indoor unit.
- Outdoor micro computer to indoor micro computer

  Request signal output from IF transmitting output pin ⑭ of outdoor microcomputer input to transmitting circuit. Transmitting circuit and receiving circuit of the outdoor unit are provided inside HIC. Transmitting circuit intermits high frequency oscillation circuit of about 36kHz with comparator according to the request signal. This high frequency signal is amplified by the transistor and is output from HIC ㊶ pin, then superimposed with DC 35V line via C701 and L701.

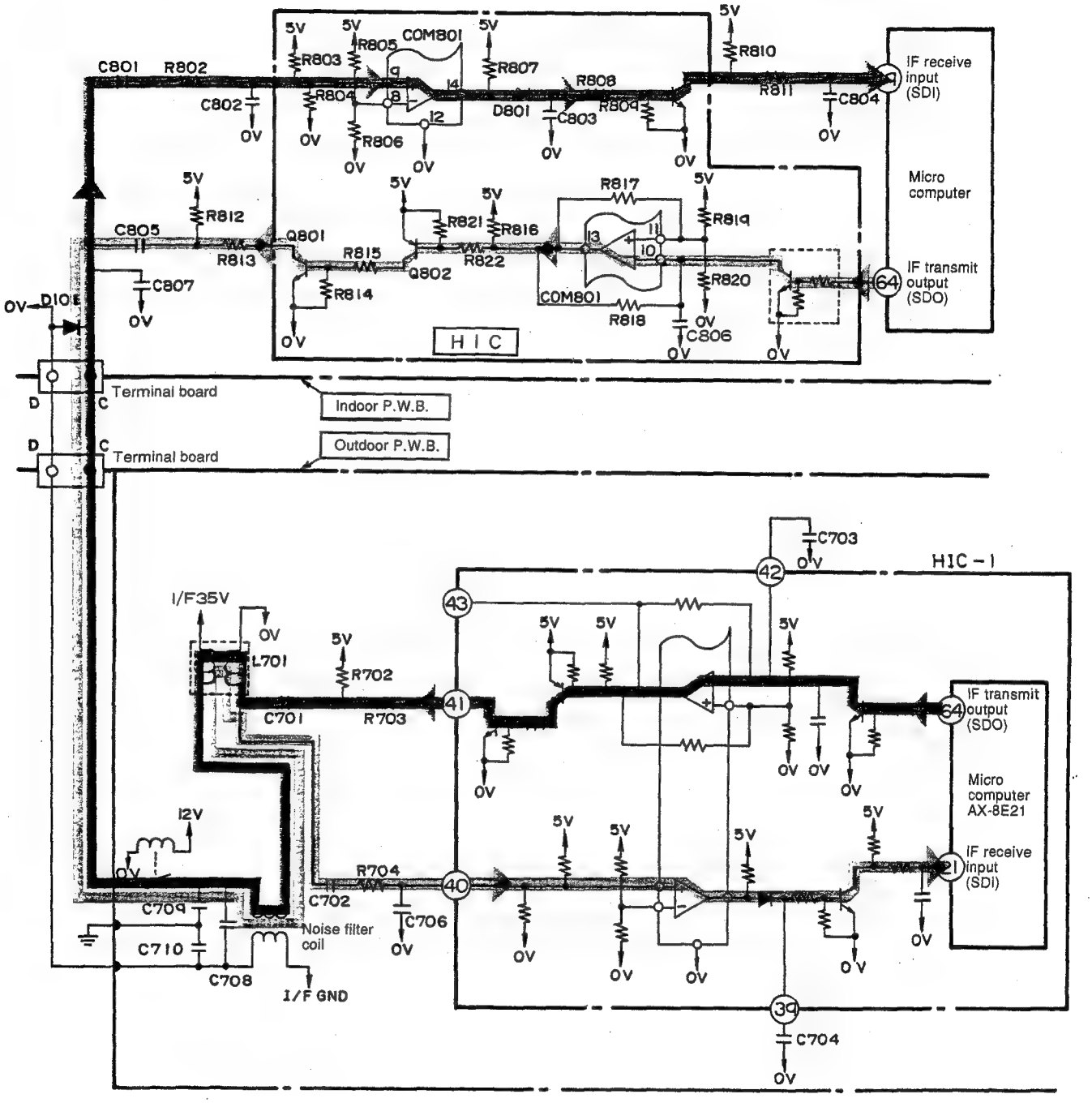
  To prevent mis-operation, outdoor microcomputer does not accept receive signal while outputting request signal.

  The receiving circuit of the indoor unit consists of COM801 and Q804. The interface signal from the outdoor unit, whose DC component is cut from DC35V line at C801, is waveform-shaped and rectified-amplified in HIC, then input to receive input pin ⑲ of indoor microcomputer.

  Fig. 2–2 shows voltage at each point during communications from outdoor unit to indoor unit.
- Indoor micro computer to outdoor microc omputer

  The communications from the indoor micro computer to the outdoor micro computer are the same. Fig. 2–3 shows the voltages and waveforms at each circuit.

- Fig. 2–1 shows the interface circuit used for the indoor and outdoor micro computers to communicate with each other.



(Communications from indoor micro computer to outdoor micro computer)

(Communications from outdoor micro computer to indoor micro computer)

Fig. 2 – 1 Indoor/outdoor interface Circuit

[Serial Communications Data]

(1) Outdoor message

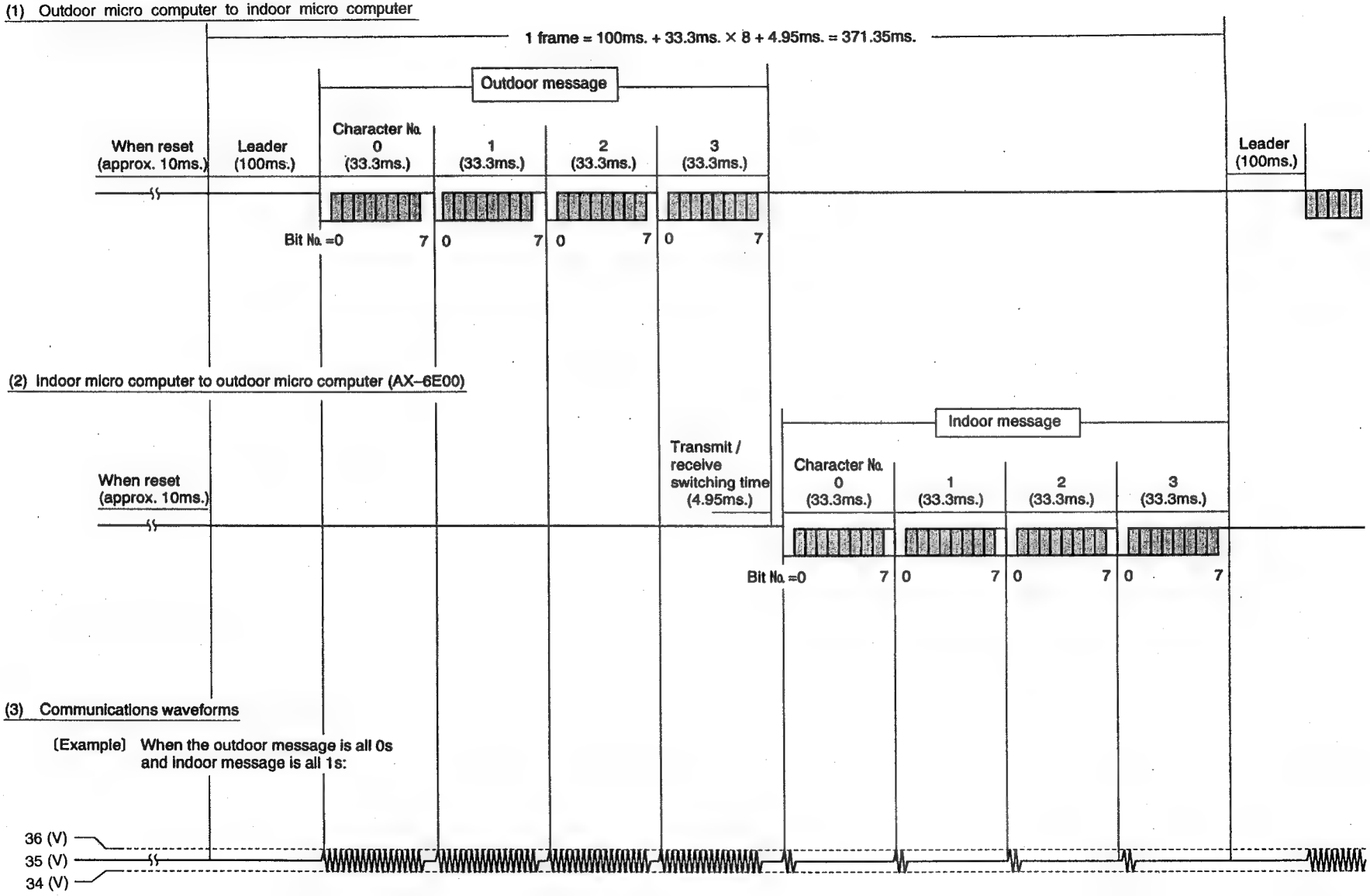
Character No.	Bit No.	Contents	Data
0	0	Multi-bit	1/10
0	1		0
0	2	During forced operation	1/10
0	3	Defrost request signal	1/10
0	4	Self-diagnosis (0 LSB)	1/10
0	5	Self-diagnosis (1)	1/10
0	6	Self-diagnosis (2)	1/10
0	7	Self-diagnosis (3 MSB)	1/10
1	0	Outside temperature (0 LSB)	1/10
1	1	Outside temperature (1)	1/10
1	2	Outside temperature (2)	1/10
1	3	Outside temperature (3)	1/10
1	4	Outside temperature (4)	1/10
1	5	Outside temperature (5)	1/10
1	6	Outside temperature (6)	1/10
1	7	Outside temperature (7 MSB)	1/10
2	0	Compressor actual rotation speed (0 LSB)	1/10
2	1	Compressor actual rotation speed (1)	1/10
2	2	Compressor actual rotation speed (2)	1/10
2	3	Compressor actual rotation speed (3)	1/10
2	4	Compressor actual rotation speed (4)	1/10
2	5	Compressor actual rotation speed (5)	1/10
2	6	Compressor actual rotation speed (6)	1/10
2	7	Compressor actual rotation speed (7 MSB)	1/10
3	0	Preheating request during balancing	1/10
3	1	Preheating request during defrosting	1/10
3	2	Indoor operation stop request	1/10
3	3	Indoor faulty stop request	1/10
3	4	Heater inhibit request	1/10
3	5		0
3	6	Fast forward 1/1000 (commercial test)	1/10
3	7	Fast forward 1/10000 (commercial test)	1/10

(2) Indoor message

Character No.	Bit No.	Contents	Data
0	0	Operation mode (0 LSB)	1/10
0	1	Operation mode (1)	1/10
0	2	Operation mode (2 MSB)	1/10
0	3	Indoor in-operation bit	1/10
0	4	Capacity code (0 LSB)	1/10
0	5	Capacity code (1)	1/10
0	6	Capacity code (2)	1/10
0	7	Capacity code (3 MSB)	1/10
1	0	Fan (0 LSB)	1/10
1	1	Fan (1)	1/10
1	2	Fan (2 MSB)	1/10
1	3	2-way valve	1/10
1	4	Reversing valve	1/10
1	5		0
1	6		0
1	7	Compressor ON	0
2	0	Compressor actual rotation speed (0 LSB)	1/10
2	1	Compressor actual rotation speed (1)	1/10
2	2	Compressor actual rotation speed (2)	1/10
2	3	Compressor actual rotation speed (3)	1/10
2	4	Compressor actual rotation speed (4)	1/10
2	5	Compressor actual rotation speed (5)	1/10
2	6	Compressor actual rotation speed (6)	1/10
2	7	Compressor actual rotation speed (7 MSB)	1/10
3	0	15/20(A)	1/10
3	1	Commercial test	1/10
3	2	Immediate heating	1/10
3	3	Compressor minimum rotation speed (0 LSB)	1/10
3	4	Compressor minimum rotation speed (1)	1/10
3	5	Compressor minimum rotation speed (2)	1/10
3	6	Compressor minimum rotation speed (3)	1/10
3	7	Compressor minimum rotation speed (4 MSB)	1/10

〔Serial Communications Format during Normal Communications〕

(1) Outdoor micro computer to indoor micro computer



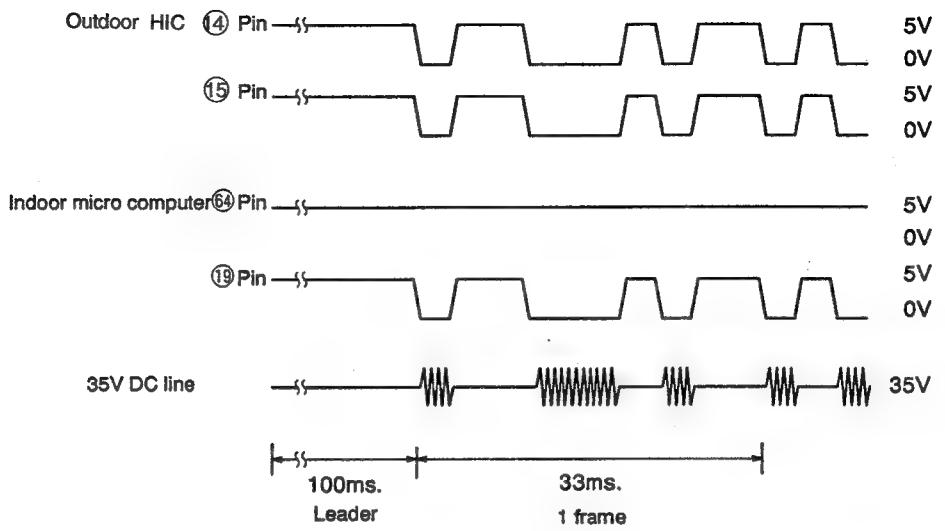


Fig. 2-2 Voltages Waveforms of Indoor / Outdoor Micro computers (Outdoor to Indoor Communications)

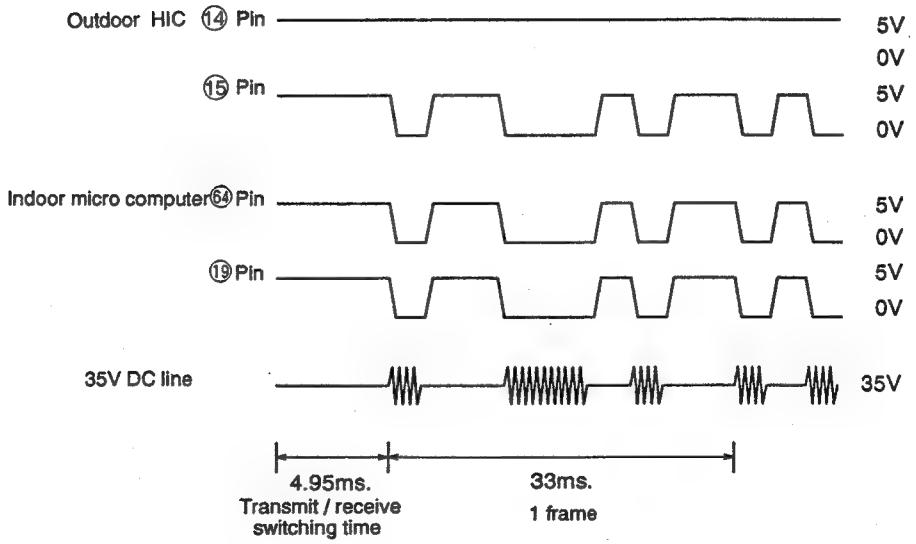


Fig. 2-3 Voltages Waveforms of Indoor / Outdoor Micro computers (Indoor to Outdoor Communications)

- Fig. 3-1 shows the power module and its peripheral circuits.
  The three transistors on the positive ⊕ side are called the upper arm, and the three transistors on the negative ⊖ side, the lower arm.

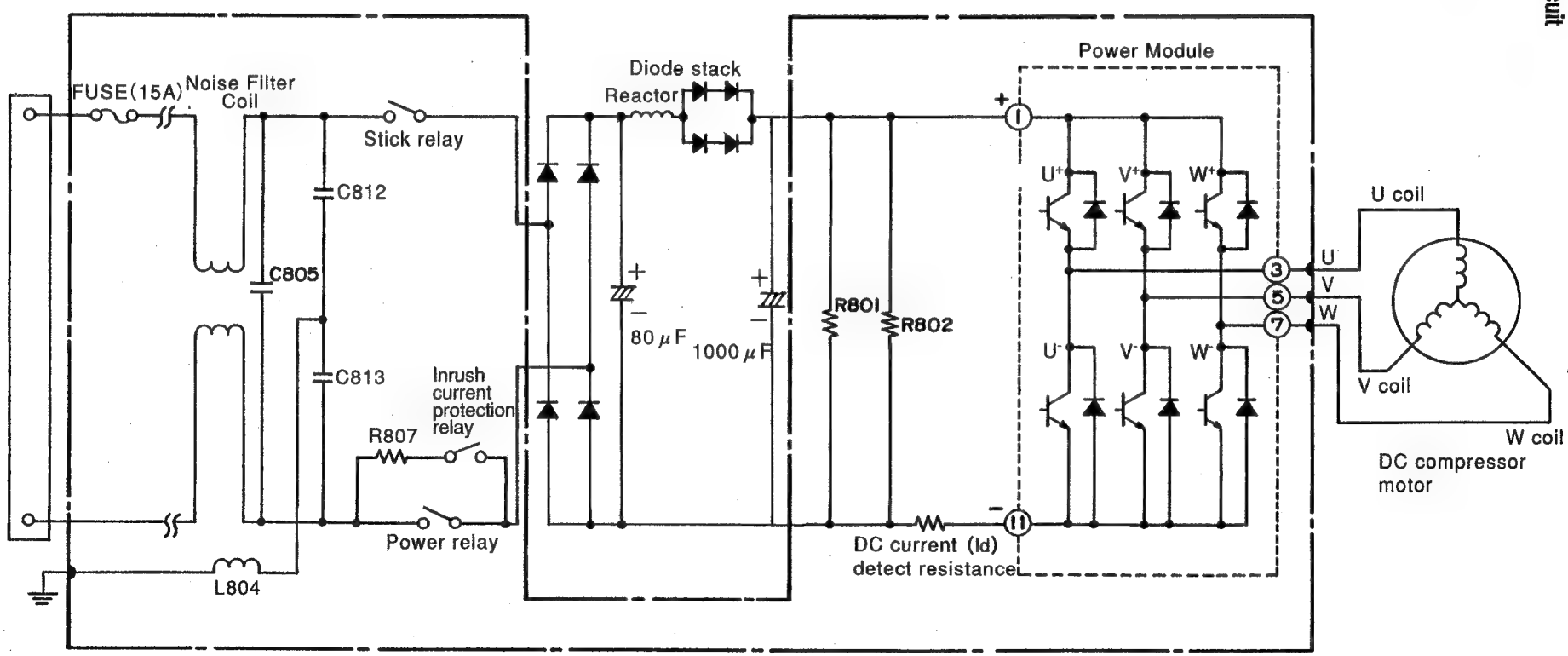


Fig. 3—1 Power module circuit (U^+ is ON, V^- is ON)

- DC 230V is input to power module and power module switches power supply current according to rotation position of magnet rotor. The switching order is as shown in Fig. 3-2.

  (* At point E: U^+ is ON, V^- is ON (circuit in Fig. 3-1)
  * At point F: U^+ is chopped (OFF), V^- is ON (circuit in Fig. 3-4))

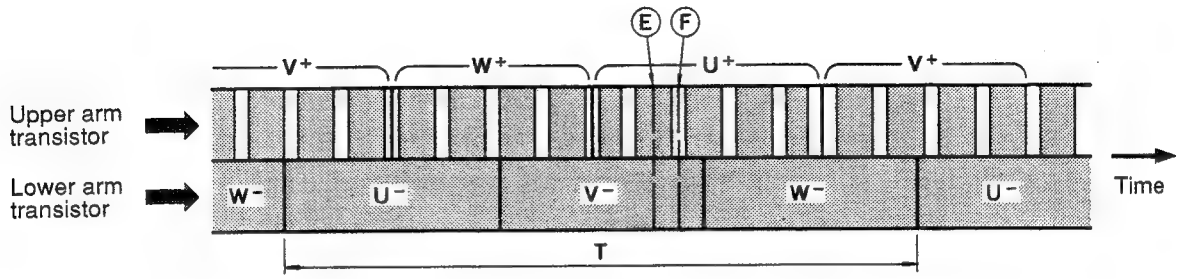


Fig. 3 — 2 Switching order of power module

- Upper arm transistor is controlled to ON/OFF by 3.2kHz chopper signal. Rotation speed of the compress is proportional to duty ratio (ON time/ ON time + OFF time) of this chopper signal.
- Time T in Fig. 3-2 shows the switching period, and relation with rotation speed (N)of the compressor is shown by formula below;

$$N = 60/2 \times 1/T$$

- Fig. 3-3 shows voltage waveform at each point shown in Figs. 3-1 and 3-4.

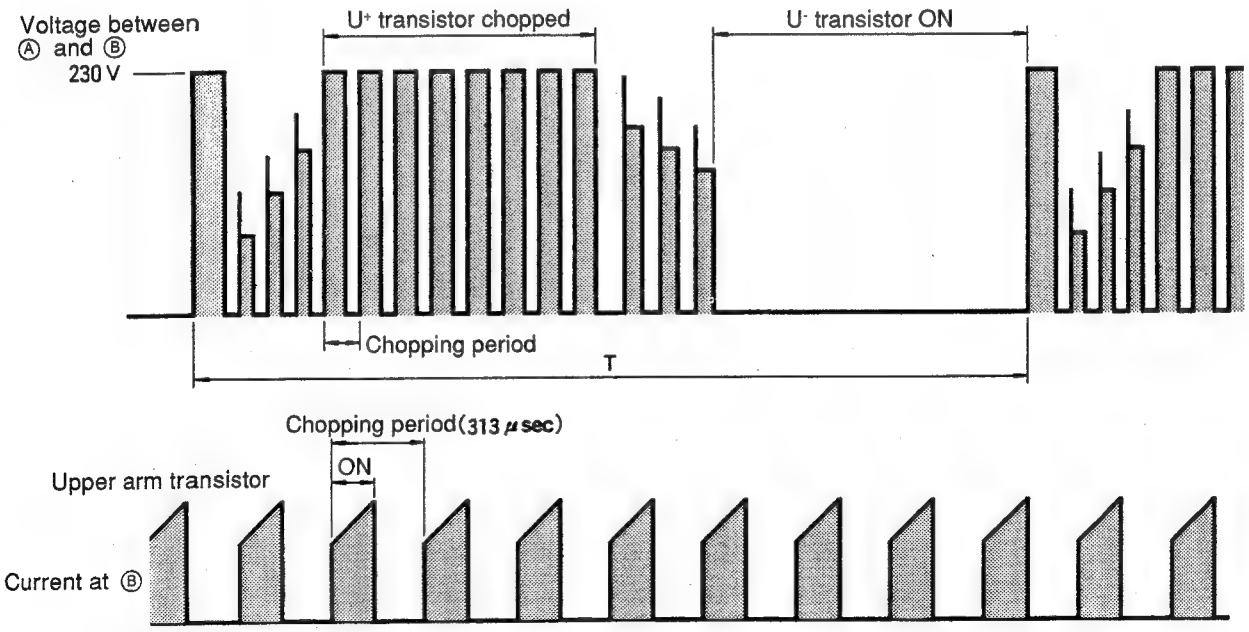


Fig. 3 — 3 Voltage waveform at each point

- When power is supplied $U^+ \rightarrow U^-$, because of that U^+ is chopped, current flows as shown below; Ⓑ
  (1) When U^+ transistor is ON: U^+ transistor → U coil → V coil → V^- transistor → DC current detection resistor → Point Ⓑ (Fig. 3-1)
  (2) When U+ transistor is OFF: (by inductance of motor coil) U coil → V coil → V^- transistor → Return diode → Point Ⓐ (Fig. 3-4)

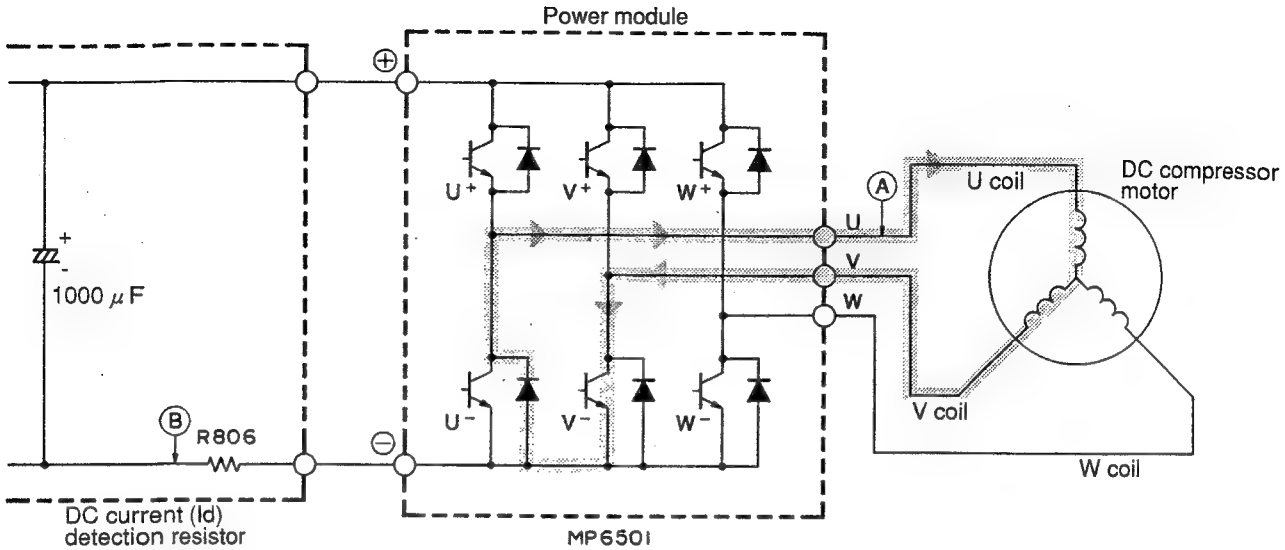


Fig. 3 — 4 Power module circuit (U+ is ON, V- is ON)

- Since current flows at point Ⓑ only when U+ transistor is ON, the current waveform at point Ⓑ becomes intermittent waveform as shown in Fig. 3-3. Since current at point Ⓑ is approximately proportional to the input current of the air conditioner, input current is controlled by using DC current (Id) detection resistor.

<Reference>

If power module is defective, self diagnosis lamps on the control P.W.B. may indicate as shown below;

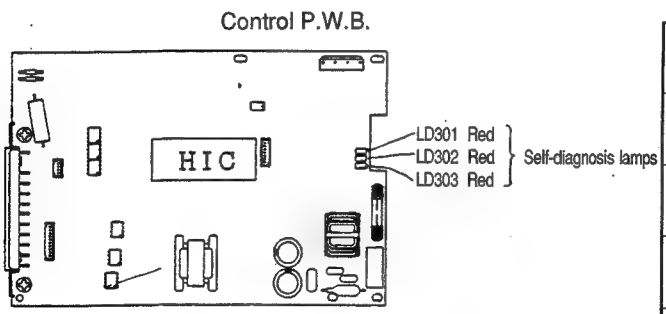


Fig. 3 — 5

Table 3 — 1

Self-diagnosis	Self-diagnosis lamp and mode	
Ip (peak current cut)	LD301	Blinks 2 times
Abnormal low speed rotation	LD301	Blinks 3 times
Switching incomplete	LD301	Blinks 4 times
Half voltage error	LD301	Blinks 10 times

- Simplified check of power module (Lighting mode when operated with compressor leads disconnected)
  (1) Disconnect connector of 3-pole (WHT, YEL, RED) lead wire connecting to compressor located at the lower part of electric parts box.
  (2) Set to compressor operation state (other than FAN mode) and press Start/stop switch of remote control.
  (3) If normal operation continues for more than 1 minute (LD303 lights), power module is considered normal.
  ※ Refer to other item (troubleshooting on page 109) for independent checking of power module.

4. Power circuit for P.W.B.

- Fig. 4-1 shows the power circuit for P.W.B. and waveform at each point.

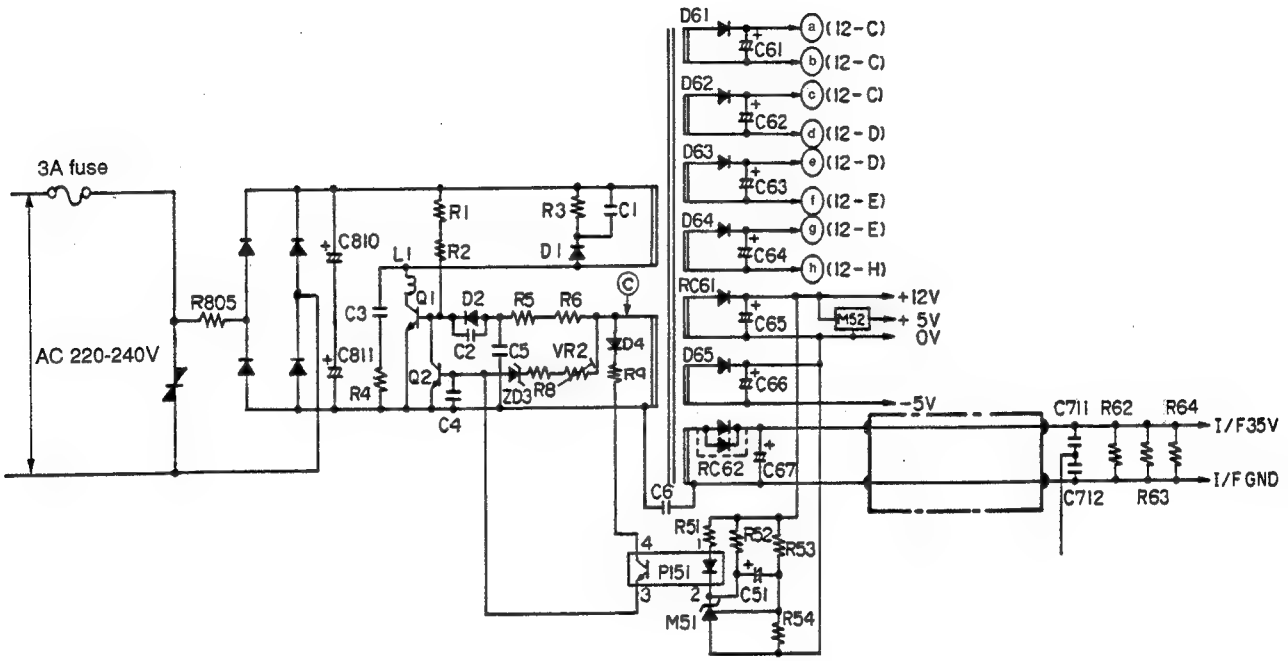


Fig. 4 — 1 Power circuit for P.W.B.

- In the power circuit for P.W.B., power voltage for microcomputer, peripheral circuits, and power module drive and, as well as DC35V, are produced by switching power circuit.
- Switching power circuit performs voltage conversion effectively by switching transistor Q1 to convert DC270V voltage to high frequency of about 20kHz to 70kHz.
- Transistor Q1 operates as follows:

(1) Shifting from OFF to ON

- DC about 270V is applied from smoothing capacitors C810 ⊕ and C811 ⊖ in the control power circuit. With this power, current flows to base of transistor Q1 via R1 and R2 and Q1 starts to turn ON. Since voltage in the direction of arrow generates at point © at the same time, current passing through R5, R6 and D2 is positive- fed back to Q1.

(2) During ON period

- Collector current of Q1 is increased directly. In this period, base current is fixed by saturation characteristic of transformer.

(3) Shifting from ON to OFF

- In this circuit, feed back (negative) is applied from 12V output. When voltage between both ends of C65 reaches the specified value, M51 is turned ON and current flows between pin ① and ② of PI51, secondary side is turned ON, current flows to base of Q2 via R9 and D4, Q2 is turned ON, and Q1 base current is bypassed to turn Q1 OFF.

(4) During OFF period

- During Q1 ON period, energy as shown below is charged at primary winding of transformer and is discharged to each secondary coil during OFF period:

$$\text{Energy} = LI^2/2$$

L : Primary inductance

I : Current when Q1 is OFF

Each coil C61 ~ C67 is charged according to the winding ratio.

ZD3 turns ON Q2 to bypass Q1 base current during ON period to fix value of voltage in the direction of arrow.

For example, when applied voltage to Q1 is high, voltage in the direction of arrow will rise, and current bypassing to Q2 is increased.

- Overcurrent flows at Q1 due to charged current at C61 ~ C67 when starting operation.
- When ZD3 reaches ON voltage as a result of the voltage generated in the direction of arrow by Q1 collector current, Q2 is turned ON and Q1 base current is bypassed.
- By limiting base current with Q2, Q1 is prevented from allowing too much collector current to flow.

<Reference>

- When power circuit for P.W.B. is estimated as abnormal:

(1) Check that power voltages of 5V, 12V on the control P.W.B., and also power voltage of upper arm U, V and W and lower arm are specified values.

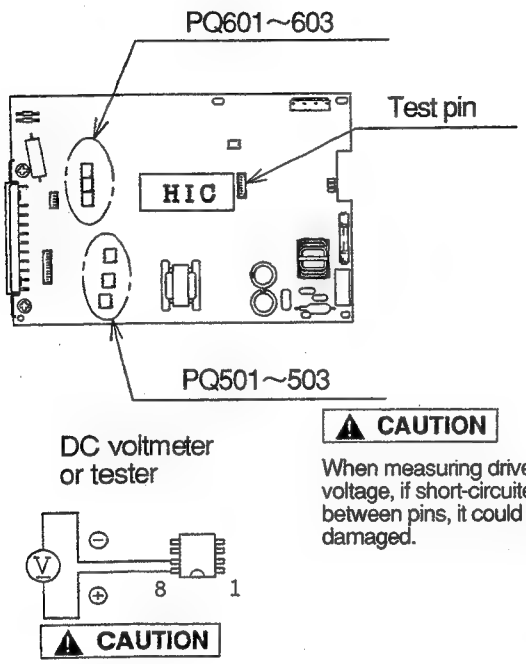


Fig. 4 — 2

- Check 5V (±0.5V), 12V($\pm^{1V}_{1.5V}$) and ⊖ 5V ($\pm^{1V}_{1.5V}$) using test pin.
- Check as follows to measure power voltage of upper arm (U,V,W) and lower arm drive circuit:
  a) U phase of upper arm
     Apply ⊕ terminal of tester to pin ⑧ of PQ501.
     Apply ⊖ terminal of tester to pin ⑦ of PQ501.
  b) V phase of upper arm
     Apply ⊕ terminal of tester to pin ⑧ of PQ501.
     Apply ⊖ terminal of tester to pin ⑦ of PQ502.
  c) W phase of upper arm
     Apply ⊕ terminal of tester to pin ⑧ of PQ503.
     Apply ⊖ terminal of tester to pin ⑦ of PQ503.
  d) Lower arm
     Apply ⊕ terminal of tester to pin ⑧ of PQ601.
     Apply ⊖ terminal of tester to pin ⑦ of PQ601.

CAUTION

※ Be careful not to short-circuit by touching of tester terminals, etc.

(2) Abnormal only when output of 5V voltage has decreased:
Regulator 1 is abnormal, short-circuited between 5V and 0V, or output too high.

(3) When 12V and 5V voltage are abnormal:
① Mainly;
② Fan, operation, power, or inrush current protective relays (short-circuit inside relay, etc.)
③ HIC abnormal
Regulator 1 abnormal, etc.
Primary side short-circuited.
When secondary side is short-circuited, primary side is normal because of overcurrent protective device.
Voltage rise when primary side is open, feed back system abnormal.

(4) When each phase of upper arm U, V, W or lower arm power is abnormal:
D61~D65, RC61, RC62 or drive circuit is abnormal.

(5) When all voltages are abnormal:
Q210, ZD201, R205, etc. may be abnormal.
※ Be careful, if Q201 is abnormal, other parts such as power module, HIC, regulator could be defective.

5. Reversing valve control circuit

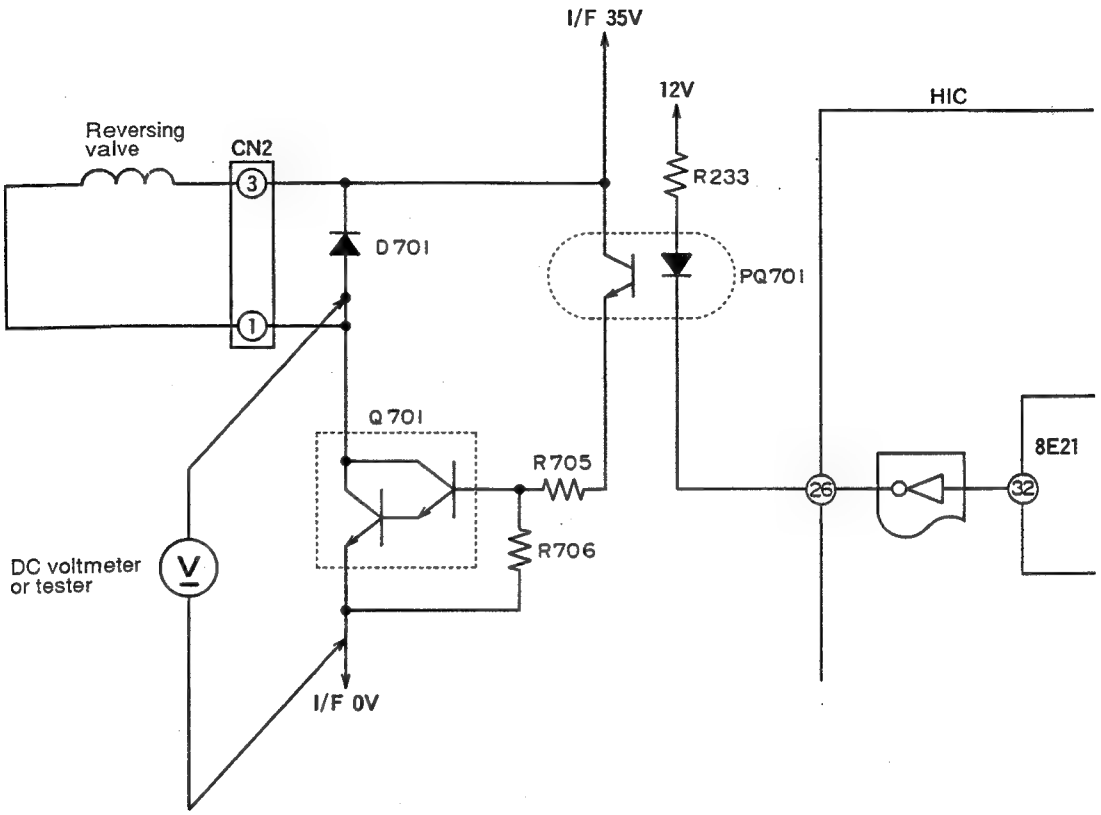


Fig. 5 — 1

※ Since the reversing valve is differential pressure system, even when reversing valve is ON (collector voltage of Q701 is about 0.8V normally), compressor rotation speed instructed by indoor microcomputer exceeds 3300min^{-1}, signal at pin ㉔ of HIC changes, and collector voltage of Q701 will be about 35V. This does not indicate trouble. When rotation speed is reduced under 2700min^{-1}, collector voltage of Q701 will fall to about 0.8V again. To measure voltage, connect ⊕ terminal of tester to D701 anode and ⊖ terminal to D line on the terminal board.

- By reversing valve control circuit you can switch reversing valve ON/OFF according to instruction from indoor microcomputer and depending on operation condition.

  Voltage at each point in each operation condition is approximately as shown below when measured by tester. (When collector voltage of Q701 is measured)

Table 5 — 1

Operation condition		Collector voltage of Q701
Cooling	General operation of Cooling	About 35V
Heating	In normal heating operation	About 0.8V
	MAX. rotation speed instructed by indoor microcomputer after defrost is completed	About 0.8V
	Defrosting	About 35V
Dehumidifying	SENSOR DRY	About 35V

6. Rotor magnetic pole position detection circuit

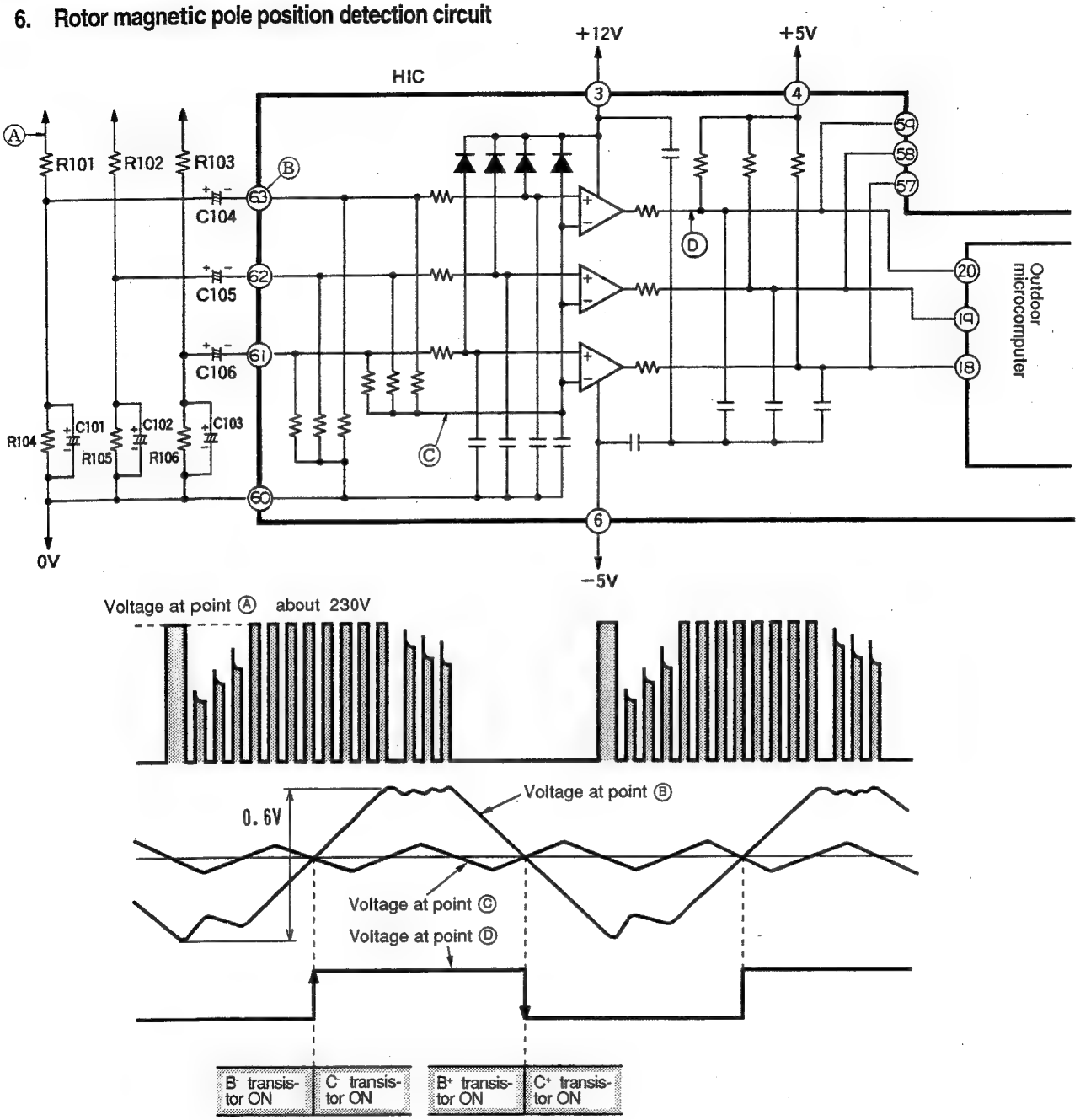


Fig. 6 — 1 Rotor magnetic pole position detection circuit and voltage waveform at each part

- Motor-induced voltage signal (voltage at point Ⓐ) is phase-shifted by 90° by passing lowpass filter consisting of R101, R104 and C101 to make triangular wave (voltage at point Ⓑ). In HIC, 3 phases of this triangular wave are synthesized to produce composite wave (voltage at point Ⓒ). This composite wave becomes a triangular wave with period of 1/3 times compared with original triangular wave.
- Voltages at points Ⓑ and Ⓒ are compared by comparator to make voltage at point Ⓓ .
  Voltage at point Ⓓ is taken into microcomputer and timing of switching from V^- transistor to W^- transistor is made by rising waveform, and timing of switching from V^+ transistor to W^+ transistor is made by falling waveform.
- For other 2 phases (V phase and W phase), the operation is the same and phases are shifted by 120° and 240° respectively compared with U phase waveform.

7. Drive Circuit

(1) Upper Arm Drive Circuit

Fig. 7-1 shows the upper arm drive circuit.

The circuit configuration is completely the same for phases A, B and C.

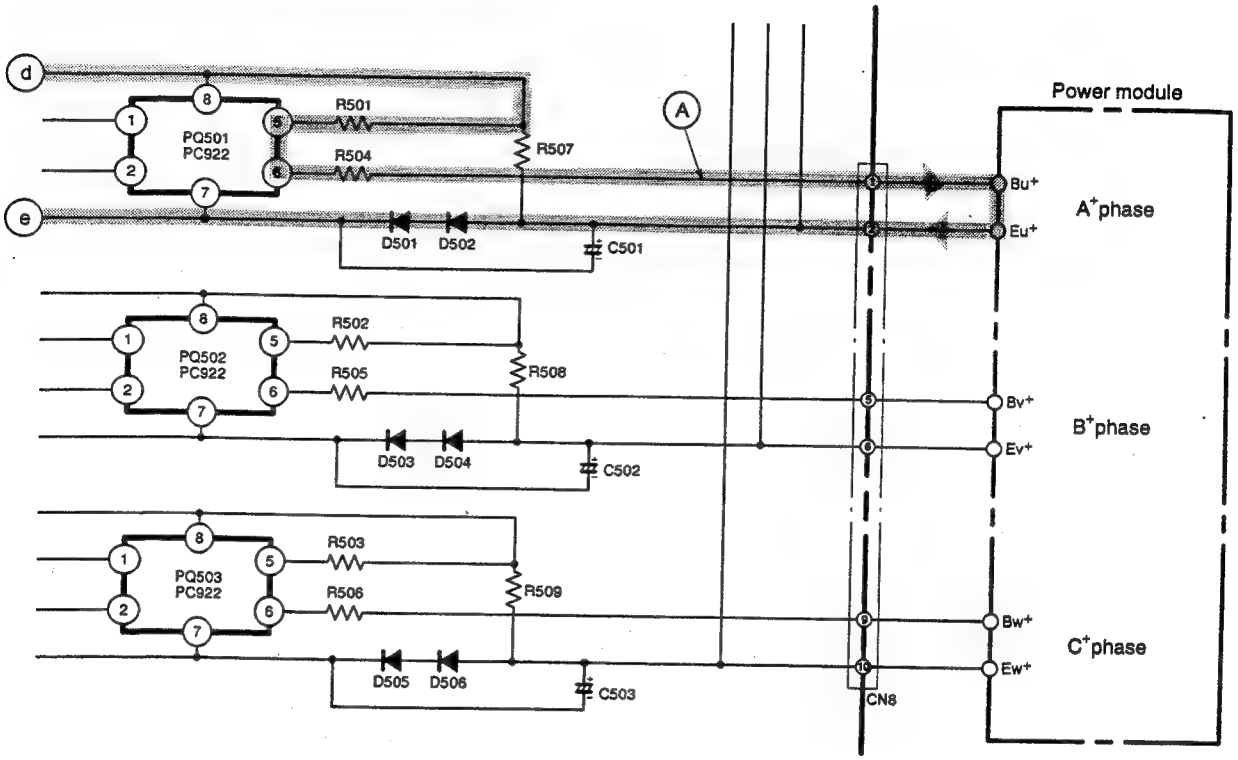


Fig. 7-1

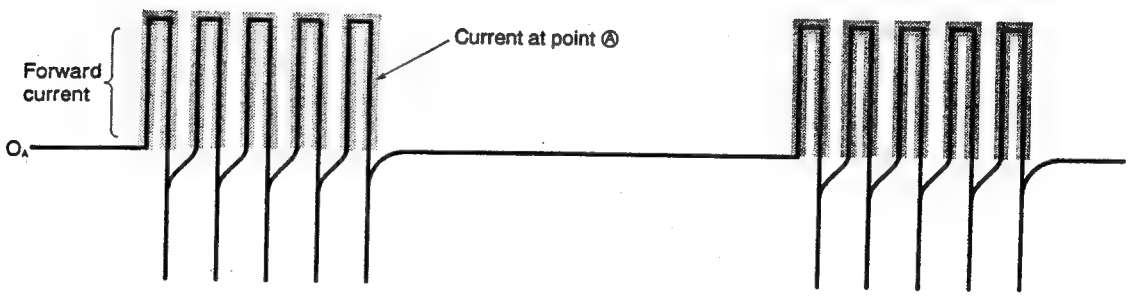
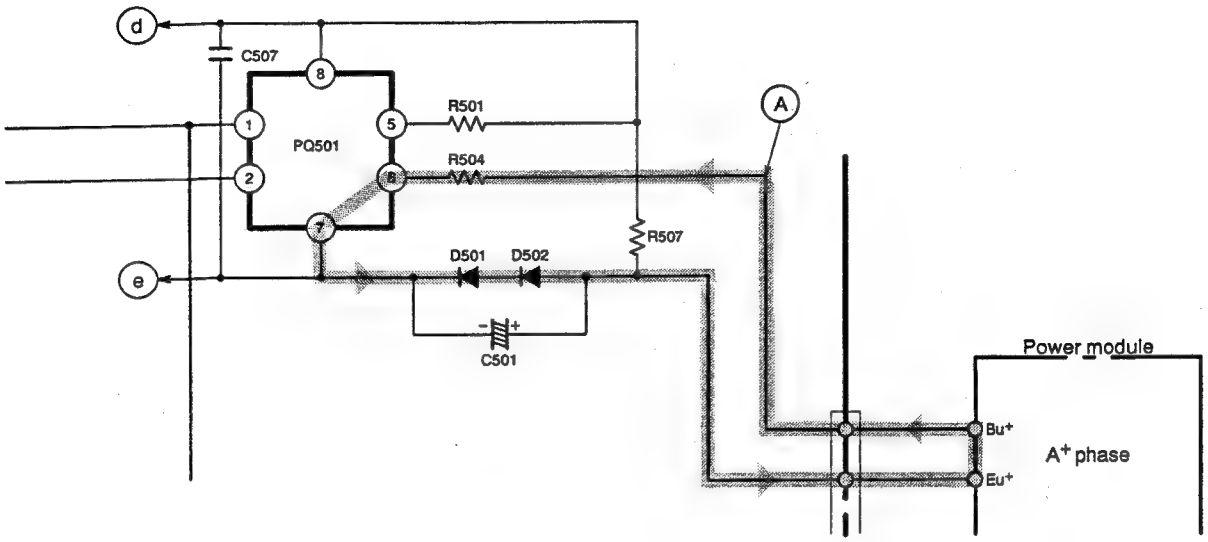


Fig. 7-2 Forward Current Waveform at Point Ⓐ

- When pin ㊳ of HIC-1 goes "Hi" → "Lo", a photocoupler between PQ501 pins ① and ② turns on and current flows to terminal ⓓ → R501 → PQ501 → R504 → power module's Bu+ terminals → Eu+ terminals → D502 → D501 → terminal ⓔ and drives the upper arm transistors. (Fig. 7-2)
- As described in the rotor magnetic pole position detecting circuit, the upper arm drive circuit supplies current to the bases of the transistors on the power module's positive ⊕ side which turn on or off according to the position detection signals. The signals according to the position detection signals are output from pins ㉗, ㉘ and ㉙ of the micro computer and are input to pins ① of photocouplers PQ501-PQ503 via driver IC1.

- When pin (38) of HIC-1 then goes "Hi" → "Lo", a photocoupler between PQ501 pins ① and ② turns off and the reverse bias current flows to C501 → power module's Eu^+ terminals → Bu^+ terminals → R504 → PQ501 to cut off the upper arm transistors. (Fig. 7-3)



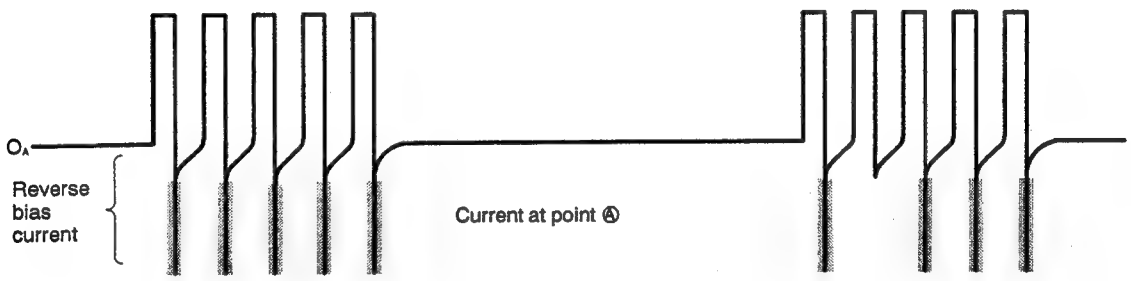


Fig. 7-3 Waveform of Transistor Base Current (Reverse Current at Point Ⓐ)

- R507 is used to charge C501 initially.
- The operation is the same for B^+ and C^+ phases.

(2) Lower Arm Drive Circuit

Fig. 7-4 shows the lower arm drive circuit.

The circuit configuration is completely the same for phases A, B and C.

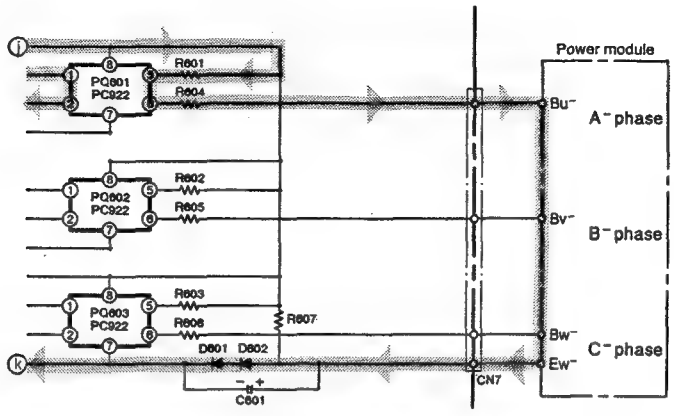


Fig. 7-4

- When pin ㉟ of the micro computer goes "Lo" → "Hi", a photocoupler between PQ601 pins ① and ② turns on and current flows to terminal ⓙ → R601 → PQ601 → R604 → power module's Bu⁻ terminals → Ew⁻ terminals → D602 → D601 → terminal ⓚ and drives the lower arm transistors. (Fig. 7-4)
- The signals which turn on or off according to the position detection signals are output from pins ㉝ ㉞ ㉟ of the micro computer in the same way as in the upper arm drive circuit and are input to pins ① of photocouplers PQ601 and PQ602 via driver IC1.
- No chopper signal is input to the lower arm drive circuit.

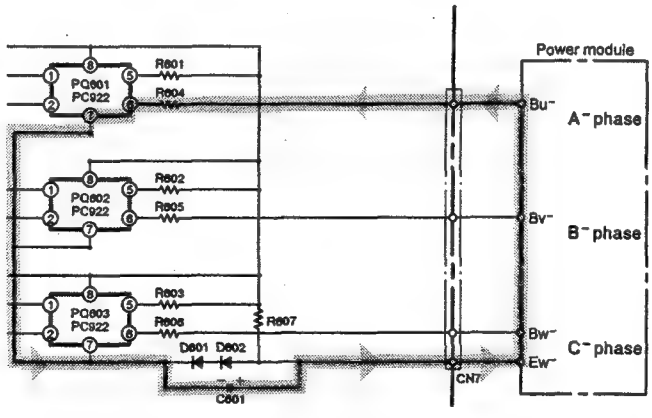


Fig. 7-5

- When pin ㉟ of the micro computer goes "Hi" → "Lo", a photocoupler between PQ601 pins ① and ② turn off and reverse bias current flows to C601 → power module's Ew⁻ terminals → Bu⁻ terminals → R604 → PQ601 to cut off the lower arm transistors. (Fig. 7-5)
- R607 is used to charge C601 initially.
- The operation is the same for B⁻ and C⁻ phases.
- When the peak current cut off function operates, HIC-1 ㉚ pins become 0V, PQ501-PQ503 and PQ601-PQ603 turn off and the upper/lower arm drive circuits stop.
- When a reset signal is applied, HIC pins ⑦ and ㉜ become open, PQ501-PQ503 and PQ601-PQ603 turn off and the upper/lower arm drive circuits stop.

8. HIC and Peripheral Circuits

- Fig. 8–1 shows the micro computer and its peripheral circuits, Table 8–1, the basic operations of each circuit block, and Fig. 8–2, the system configuration.

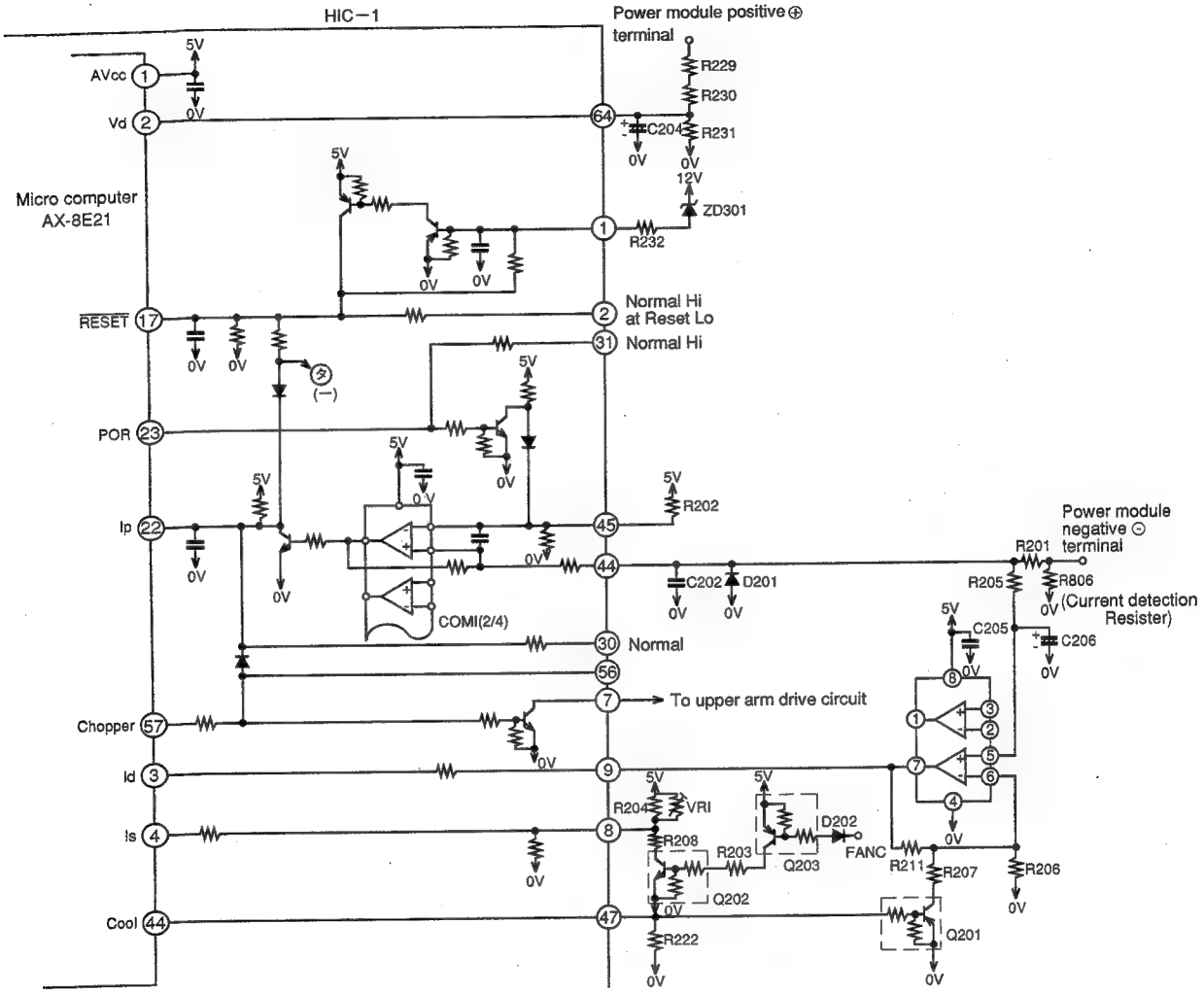


Fig. 8-1 Micro computer(AX-8E21) and peripheral circuits

Table 8–1

Circuit block	Basic operation
Peak current cutoff circuit	Detects DC current flowing power module and during overcurrent (instantaneous value) flows, stops upper/lower arm drive circuits and also produces Ip signal by which drive signal output (HIC ㉝ ~ ㊳ from microcomputer is stopped.
Set value circuit	Compares voltage detected, amplified and input to HIC with set voltage value in microcomputer, and controls overload when set value exceeds input voltage.
Voltage amplifier circuit	Voltage-amplifies DC current level detected by the detection resistor and inputs this to microcomputer. Internal or external overload is judged in microcomputer.
Reset circuit	Produces reset voltage.
Trip signal synthesis circuit	Modulates chopper signal to drive signal and stops drive signal according to presence/absence of Ip signal or reset signal.

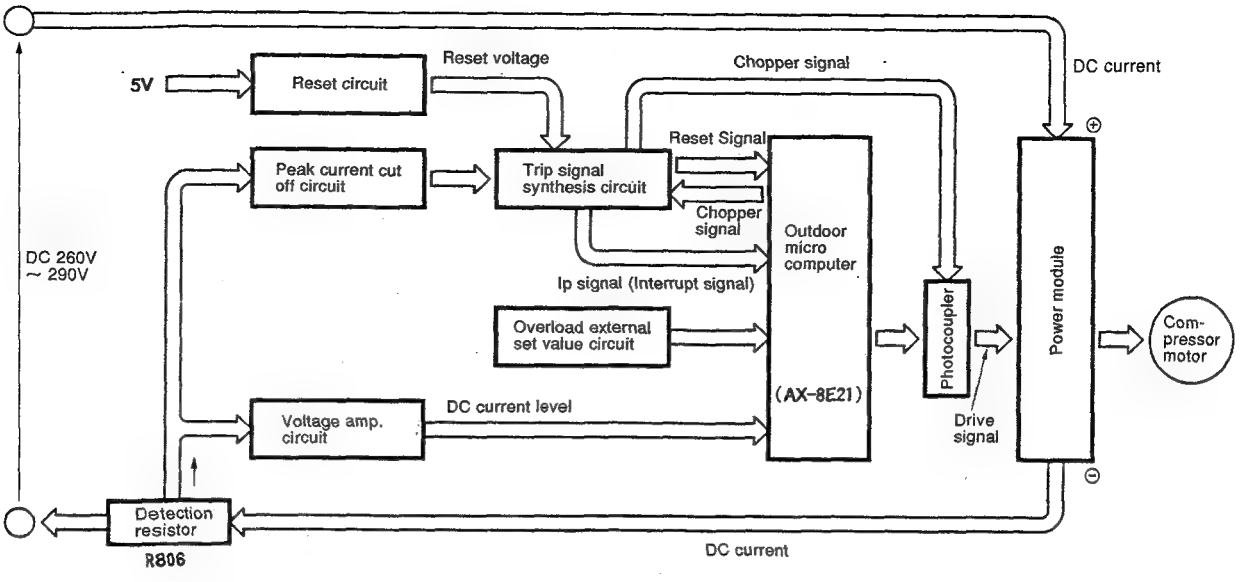


Fig. 8 — 2

- The following describes the operations of each circuit in detail.

(1) Peak current cut (Ip) off circuit

Fig. 8 - 3 shows the peak current cut off circuit and the waveforms at each section.

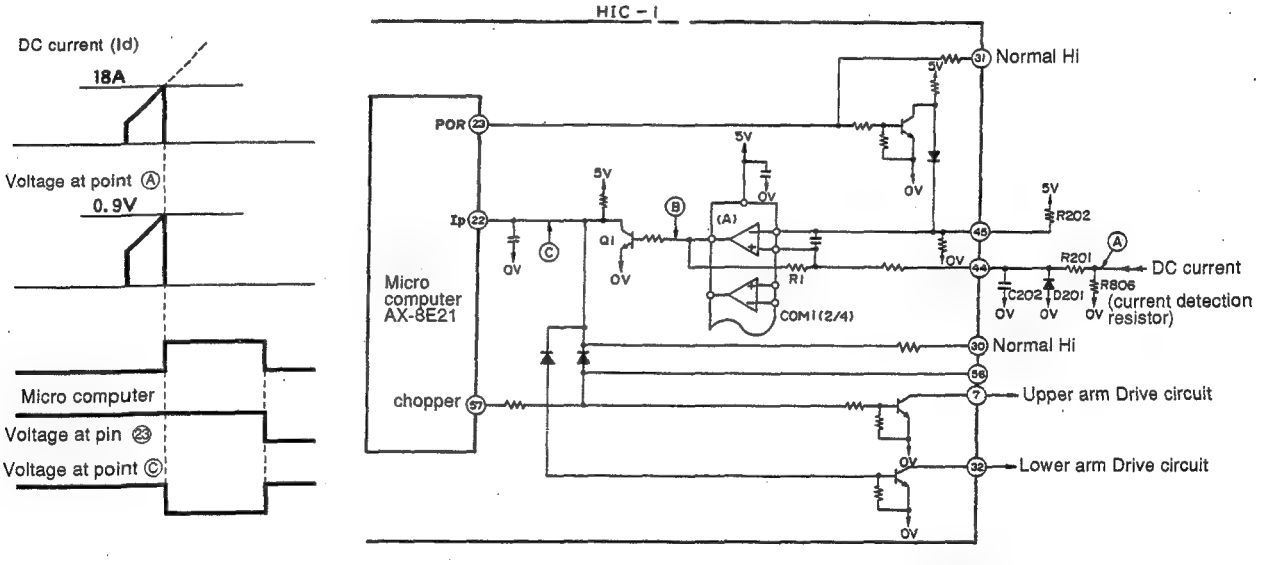


Fig. 8 — 3 Peak current cut off circuit and Waveforms at Each Section

- IP cut circuit detects instantaneous large current and stops drive output signal to protect parts such as power module, etc.
- As shown in the figure, when current exceeding 18A flows, voltage at point Ⓐ detected by detection resistor is input to ⊕ terminal of COM (A) . If it exceeds ⊖ terminal voltage, which is set value, output pin voltage (point Ⓑ) of COM (A) changes from Lo to Hi. Thus, Q1 is turned ON to stop drive circuit and, at the same time, voltage at point Ⓒ changes from Hi to Lo to send Ip signal to pin ㉒ of microcomputer (observed by pin ㉚ of HIC) and microcomputer stops drive.
- On the other hand, ⊕ terminal voltage is pulled up by R1, and DC current becomes 0A. Even when voltage at point Ⓐ returns to 0V (power is not supplied - current value of zero), output is temporarily held in Hi state since voltage at ⊖ terminal is high. (Memory function)
- Just before drive signal is output the next time, Microcomputer switches pin ㉓ from Hi to Lo (observed by pin ㉛ of HIC), so that ⊕ terminal voltage < ⊖ terminal voltage to release memory function and return to initial state.

(2) Overload control circuit (OVL control circuit)

- Overload control is to decrease the speed of the compressor and reduce the load when the load on the air conditioner increases to an overload state, in order to protect the compressor, electronic components and power breaker.
- Overloads are judgement by comparing the DC current level and set value.
- Fig. 8-4 shows the overload control system configuration and Fig. 8-5 is a characteristic diagram of overload judgement values. There are two judgement methods-external judgement which compares the externally set value with the DC current value regardless of the rotation speed and internal judgement which compares the set value that varies according to the rotation speed programmed in the micro computer software with the DC current value.

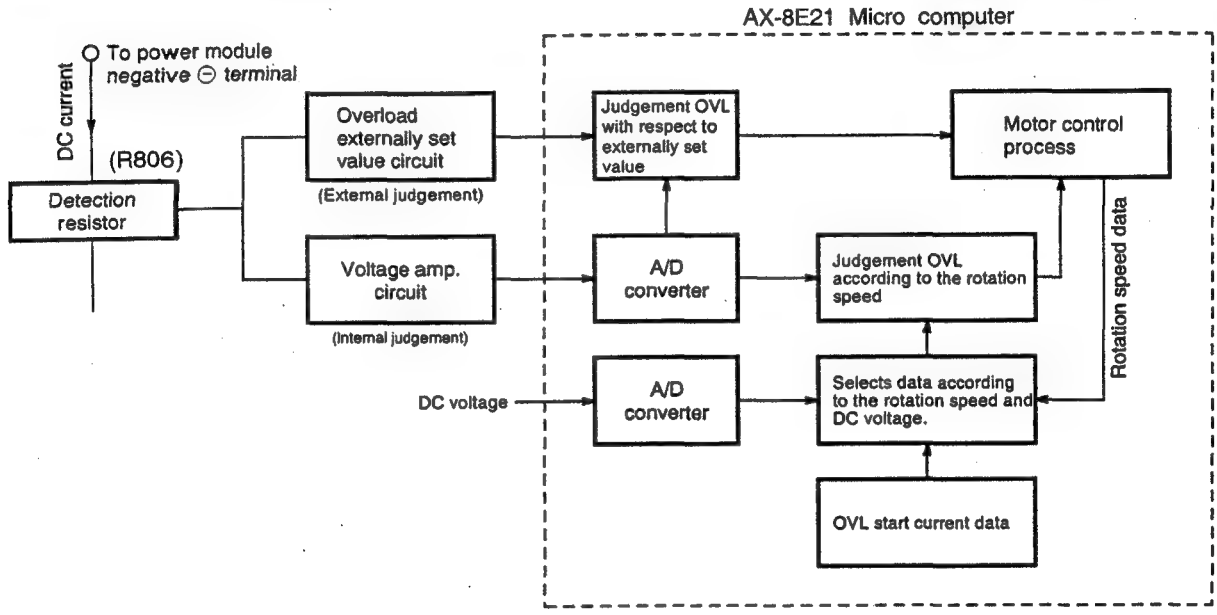


Fig. 8-4 Overload Control System Configuration

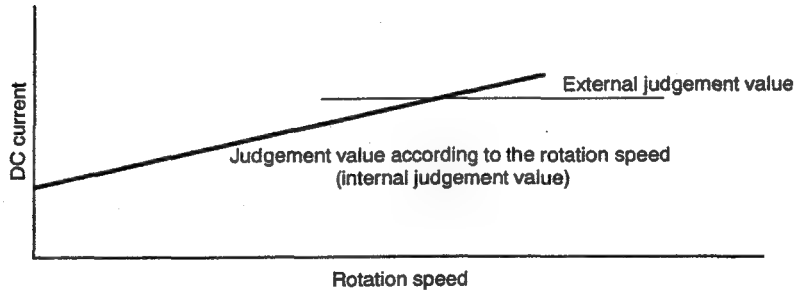


Fig. 8-5

① Overload external judgement circuit.

- The filter consisting of R320 and C1 removes high harmonic components from the voltage generated by the current flowing to R806, R2 and C304 average the voltage. This voltage is then input to OP1 pin ⑤ and amplified and is supplied to micro computer pin ⑫ which is compared with the voltage at pin ⑬. If the voltage at pin ⑫ is higher than that at pin ⑬, the micro computer enters the overload control mode.
- Fig. 8-7 shows the rotation speed control. When the voltage at pin ⑨ of HIC exceeds the set value at pin HIC ⑧, the micro computer decreases the rotation speed of the compressor and reduces the load regardless of the rotation speed commanded by the indoor micro computer.

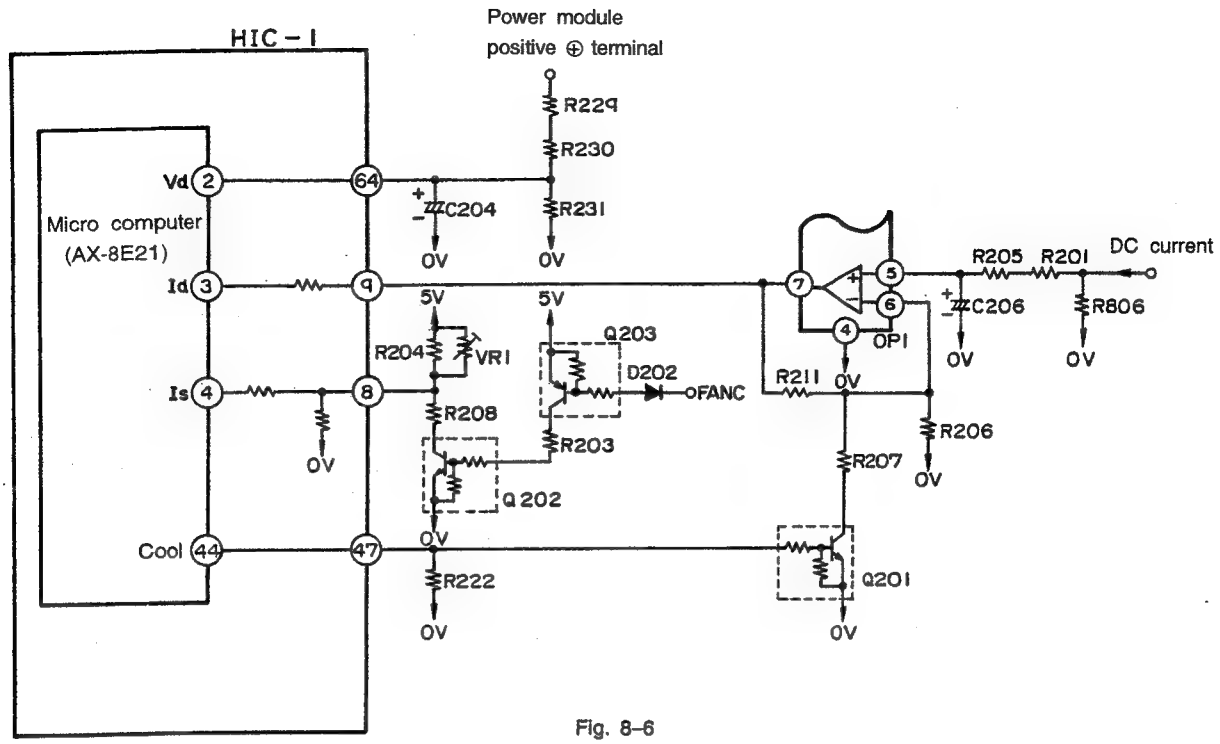


Fig. 8–6

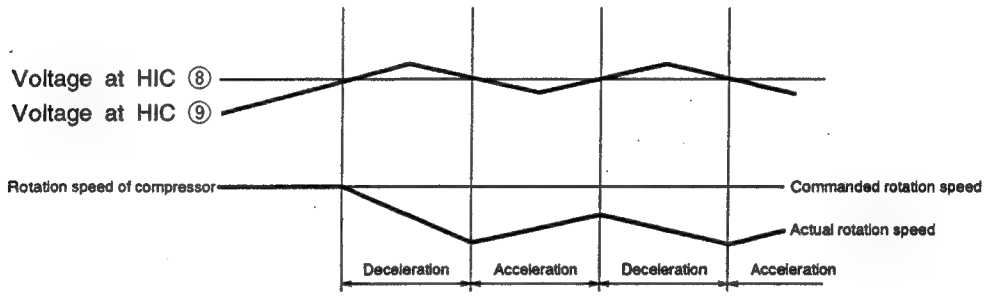


Fig. 8–7

② Voltage amp. circuit

- The voltage amp. circuit amplifies the DC current level detected by the detection resistor after being converted to a voltage and supplies it to the micro computer. Receiving this, the micro computer converts it to a digital signal and compares it with the internal data to judge whether or not overload control is required.

<During overload control>

- The filter consisting of R201 and C202 removes high harmonic components from the voltage generated from the DC current flowing to the detection resistor, and R205 and C206 average the voltage and supplies it to OP1 pin ⑤ OP1 forms a non-inverting voltage amp. circuit together with the peripheral elements.
- The micro computer stores the set values which vary according to the rotation speed as shown in Fig. 8-8. When the DC current level exceeds the set value, the micro computer enters the overload control state. The compressor motor is controlled in the same way as in external judgement described previously.
- The set value is determined by the amplification of the voltage amp. circuit.
  - Amplification: high → DC current: low
  - Amplification: low → DC current: high

- R229, R230, R231 detect the DC voltage at the power circuit. The micro computer receives a DC voltage (210-300V) via HIC (64) and applies correction to the overload set value so the DC current is low (high) when the DC voltage is high (low).
  (Since the load level is indicated by the DC voltage multiplied by DC current, R229, R230, R231 are provided to perform the same overload judgement even when the voltage varies.)

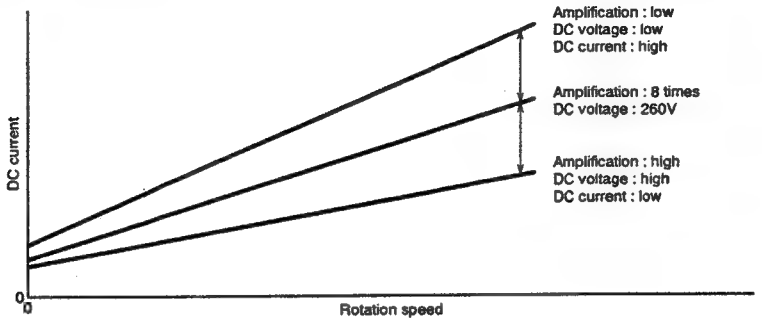


Fig. 8-8

<During start current control>

- It is required to maintain the start current (DC current) constant to smooth the start of the DC motor for the compressor.
- The RAC-25CNH1 uses software to control the start current.
- The start current varies when the supply voltage varies. This control method copes with variations in the voltage as follows.

  (1) Turns on the power module's U^+ and V^- transistors so the current flows to the motor windings as shown in Fig. 8-9.

  (2) Varies the turn-ON time of the W^+ transistor according to the DC voltage level and the start is controlled so the start current is approx. 8A as shown in Fig. 8-10.

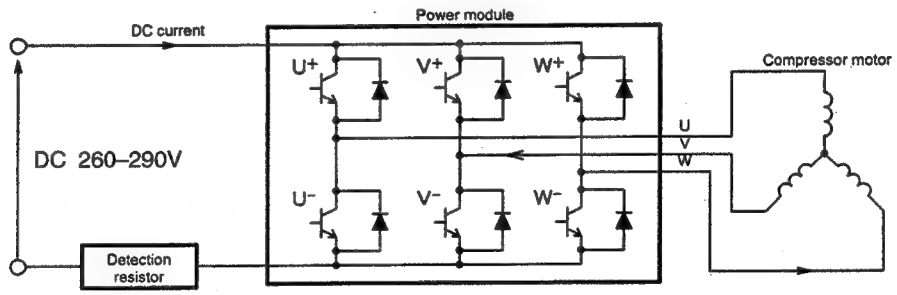


Fig. 8-9

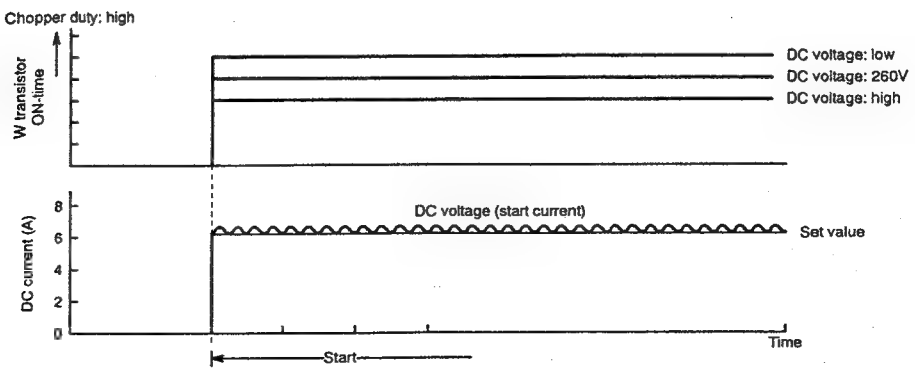


Fig. 8-10

9. Trip Signal Synthesis Circuit

- Fig. 9-1 shows the trip signal synthesis circuit.

This circuit is provided to stop the drive signal, etc. according to whether or not the Ip cut signal or reset signal is present.

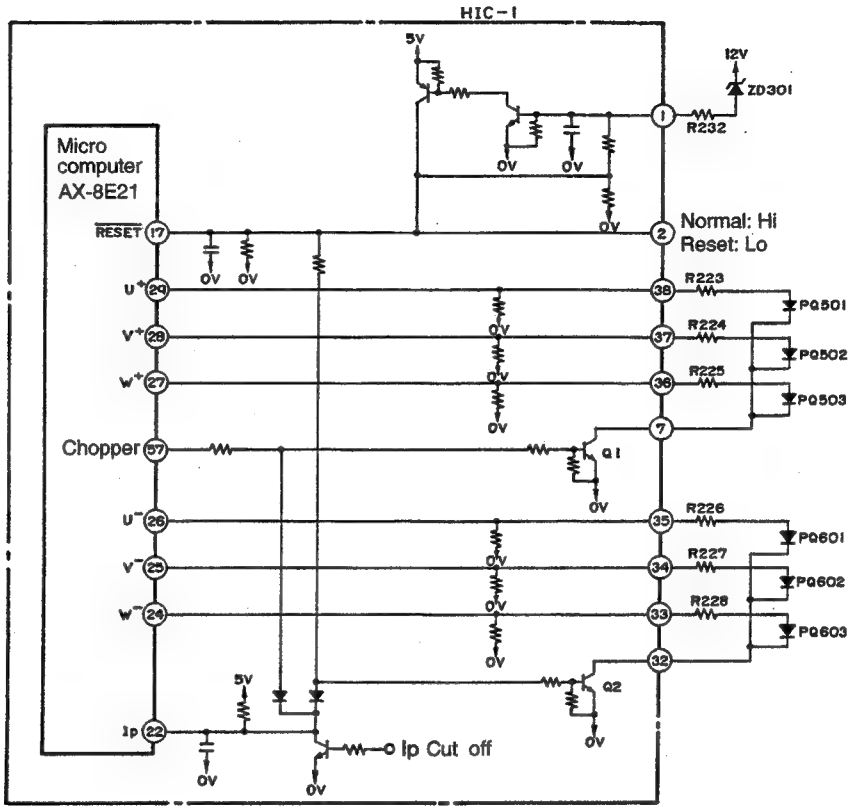


Fig. 9-1 Trip Sigmal Synthesis Circuit

- Table 9-1 shows to which circuits the various modulation signals are transferred.

For example, the chopper signal is only transferred to the upper arm transistor drive circuit and the reset signal is transferred to the micro computer and upper and lower arm transistor drive circuits.

- On the other hand, pins ㉝ – ㊳ of HIC-1 change from "Lo" to "Hi" alternately and supply the voltage to PQ501-PQ503 and PQ601-PQ603.
- The chopper signal from the micro computer is inverted by Q1 and turns PQ501, PQ502 or PQ503 ON or OFF to which a voltage is applied at a high frequency to supply current, thus transferring the upper arm drive signal.
- When the reset voltage is "Lo", the base of Q2 goes "Lo" to turn Q2 OFF and also stops the operation current of PQ601-PQ603 to switch OFF the lower arm drive signal. With the upper arm transistor drive circuit, the base of Q1 goes "Lo" and the micro computer stop supplying a voltage to PQ501-PQ503, thus switching OFF the drive signal.
- The peak current cut off (Ip cut) signal fixes the base voltages of Q1 and Q2 in the upper/lower arm transistor drive circuits at "Lo" to switch OFF the drive signal in the same way as when the reset voltage is "Lo".

Table 9-1 Circuits to Which Trips Signals are Transferred

Circuit / Each modulation signal	Micro computer	Upper arm transistor drive circuit	Lower arm transistor dirve circuit
Chopper signal	—	○	—
Start current limit signal	—	○	—
Peak current cut off signal	○	○	○
Reset signal	○	○	○

10. Temperature Detection Circuit

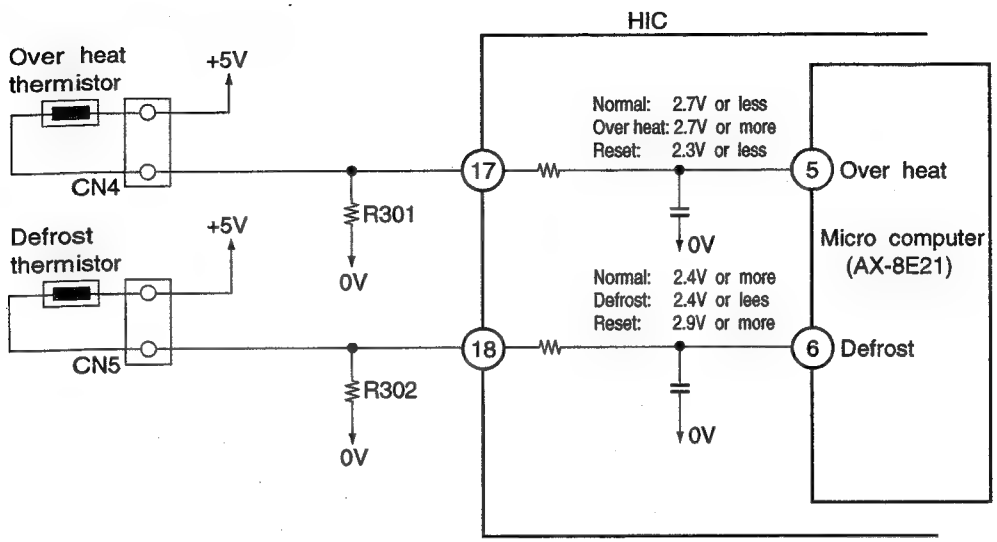


Fig. 10-1

- The Over heat thermistor circuit detects the temperature at the surface of the compressor head, the Defrost. thermistor circuit detects the defrosting operation temperature.

- A thermistor is a negative resistor element which has the characteristics that the higher (lower) the temperature, the lower (higher) the resistance.

- When the compressor is heated, the resistance of the Over heat thermistor becomes low and ⊕5V is divided by the Over heat thermistor and R301 and the voltage at pin ⑰ of HIC.

- HIC the voltage at pin ⑰ and the set value stored inside, and when it exceeds the set value, the micro computer judges that the compressor is overheated and stops operation.

- When frost forms on the outdoor heat exchanger, the temperature at the exchanger drops abruptly. Therefore the resistance of the Defrost. thermistor becomes high and the voltage at pin ⑱ of HIC drops. If this voltage becomes lower than the set value stored inside, the micro computer starts defrosting control.

- During defrosting operation the micro computer transfers the defrosting condition command to the indoor micro computer via the SDO pin IF transfer output of the interface.

11. Reset circuit

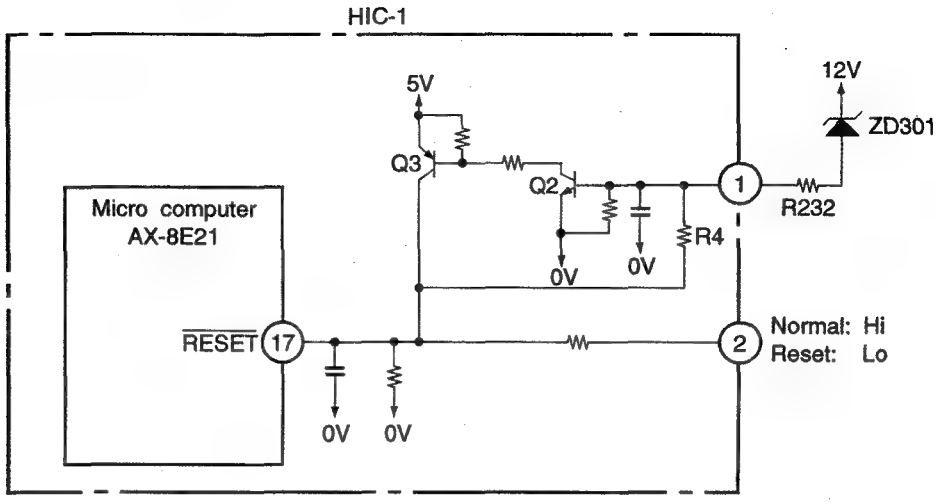


Fig. 11-1

- Reset circuit performs initial setting of the microcomputer program before power is turned on.
- Microcomputer resets program with reset voltage set to Lo, and program can be operated with Hi.
- Fig. 11-1 shows the reset circuit and Fig 11-2 shows waveform at each point when power is turned on and off.
- When power is turned on, 12V line and 5V line voltages rise and 12V line voltage reaches 7.2V (Zenor voltage of ZD501), ZD301 is turned ON, Q2 and Q3 are turned ON and reset voltage input to pin ⑰ of microcomputer is set to Hi. By ZD501, reset voltage maintains input of pin ⑰ at L_o until V_{DD} of microcomputer rises to 5V to obtain operable status.
- When power is shut off and potential of 12V is lowered, ZD501 is shifted to OFF. However, since reset voltage is fed back to Q2 by R4, Q2 maintains ON state until 12V line voltage drops to about 7.6V. This prevents reset voltage from chattering due to voltage change in 12V line.

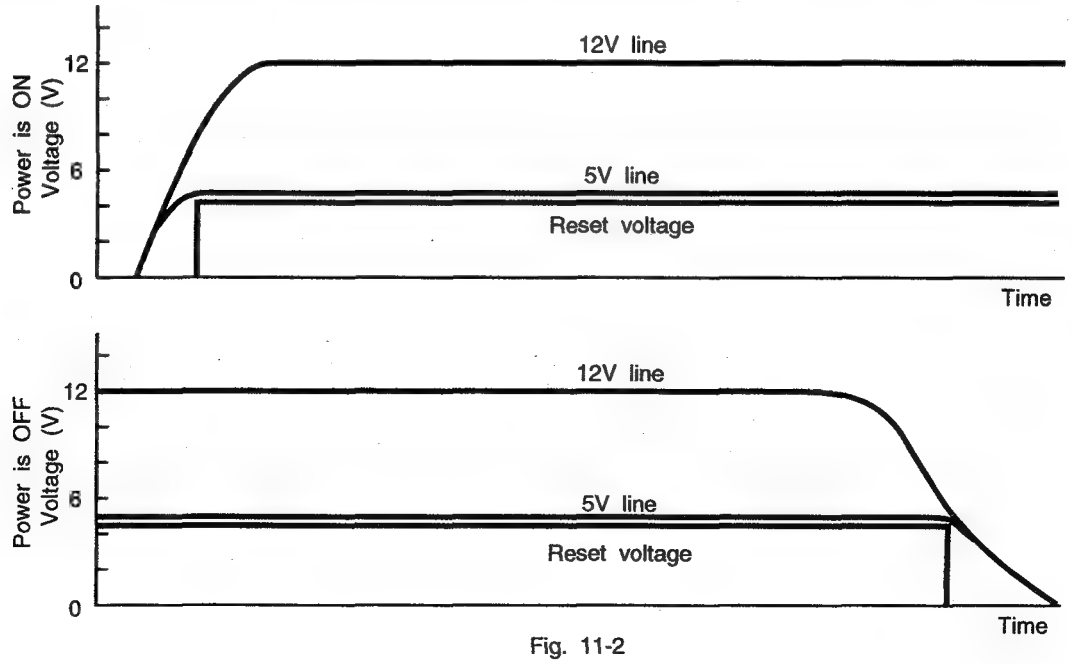


Fig. 11-2

SERVICE CALL Q & A

MODEL RAS-25CNH1/RAC-25CNH1

Cooling operation

Q1 The compressor has stopped suddenly during cooling operation.

A1 Check if frost has formed on the indoor unit heat exchanger. Wait 3 – 4 minutes until it is defrosted.

If the air conditioner operates in the cooling mode when it is cold, frost may form on the heat exchanger of the indoor unit.

Dehumidifying operation

Q2 The fan speed cannot be changed.

A2 The fan speed is fixed at "Lo" in the dehumidifying mode.

Q3 Cool air is blown in the dehumidifying mode.

A3 This is for higher dehumidifying efficiency. It is not a malfunction.

Q4 The operation is not stopped when the preset room temperature is changed higher using the remote controller during dehumidifying operation.

A4 The dehumidifying mode operates as follows by comparing the preset room temperature and the actual room temperature.

① When room temperature > preset room temperature, operation is done according to the preset room temperature of the remote controller.

② When room temperature < preset room temperature, regardless of the preset room temperature, a temperature slightly lower than the actual room temperature automatically becomes the set temperature.

Since Q4 is the case of above ②, it is not possible to operate using the room temperature control. Turn off using the Start/Stop switch once, set the preset room temperature again, then turn on using the Start/Stop switch.

Q5 Though the preset room temperature is set higher than actual room temperature using the remote controller, dehumidifying operation is done.

A5 This is the case of ② in A4. A temperature slightly lower than the actual room temeprature becomes the set temperature and the dehumidifying operation is done if possible.

Heating operation

Q6 The circulation stops occasionally during the heating operation.

A6 This occurs during defrosting. Wait for 5 – 10 minutes until the outdoor unit is defrosted.

Q7 Even when the fan speed is set to "Hi" or "Med", the operation starts in the "Lo" mode.

A7 At the begining of the heating operation, the fan speed is held to "Lo" for 30 seconds. If "Hi" is selected, operation is done at "Lo" first, then "Med" for 30 seconds and then is switched to "Hi".

Q8 Heating operation stops when the preset temperature is 30℃.

A8 If the external temperature is too high, heating operation may stop to protect the unit.

Auto fresh defrosting

Q9 After the Start/stop switch is pressed to stop heating operation, the outdoor unit still operates with the Operation lamp lit.

A9 Auto fresh defrosting is carried out. The system checks the outdoor unit and defrosts it if necessary before stopping operation.

Auto operation

Q10 In the auto operation mode, the fan speed cannot be changed using the fan speed selector switch.

A10 The auto fan speed mode is set automatically.

Q11 How is operation mode decided in AUTO operation?

A11 Automatically, Heating, Cooling or Dehumidifying is chosen according to the room temperature.
Cooling: Room temperature is higher than about 27°C.
Dehumidifying: Room temperature is about 23°C~27°C.
Heating: Room temperature is lower than 23°C.

Q12 Is it possible to adjust room temperature in the AUTO operation mode?

A12 The following conditions are set automatically:
In the cooling mode: Room temperature is set to 27°C.
In the dehumidifying mode: Temperature is set to a value slightly lower than present room temperature.
In the heating mode: Room temperature is set to 23°C.
You can raise set room temperature up to 3°C by using 「∧」, or lower it up to 3°C by using 「∨」.

When the set temperature has been changed in the AUTO operation mode, the operation mode is decided from the next operation according to the changed set room temperature. For example, if the set room temperature was lowered by 2°C in cooling operation, each mode will operate in the following conditions:
Cooling: Room temperature is higher than about 25°C.
Dehumidifying: Room temperature is about 21°C~25°C.
Heating: Room temperature is lower than 21°C.

Nice temperature reservation

Q13 When ON-timer is set, the system starts woring earlier than the reserved time.

A13 The Nice temperature reservation is working correctly. It starts working enough to reach the preset temeprature at the reserved time.
It will turn on up to 60 minutes earlier than the reserved time.

Q14 Is it possible to use the Nice temperature reservation in the dehumidifying operation?

A14 No, it is impossible. This works only in the cooling and heating operation.

Q15 Even when the reserved time is the same, the system turns on at a different time.

A15 The Nice temperature reservation is working correctly. The turn-on time varies depending on the conditions of the room. In the heating operation, since the system calculates and corrects the starting time to reach the preset temperature at the reserved time under the current conditions, the operating time is defferent every day.

Wireless remote controller

Q16 The timer setting cannot be done.

A16 Has the present time been set?
If the clock is not set, the timer cannot be set.

Q17 The present time display is turned off too soon.

A17 The present time display appears for about 10 seconds. The timer set display has priority.

When the present time is set, the display blinks for about 3 minutes.

Q18 The reserved time is erased though the timer was set.

A18 The reserved time may have been passed.
When the present time reaches the reserved time, the reserved time is erased.

Common/Others

Q19 In the auto fan speed mode, the fan speed changes over between "Hi", "Med" and "Lo".

A19 This is not a problem. The system automatically controls the fan speed to protect the blowing out of cold air.

In the Auto fan speed mode, the system detects the heat exchange temperature and automatically changes the fan speed to "Hi", "Med" and "Lo" when the temperature is low.

Q20 The noise from the outdoor gets louder at the start of operation.

A20 This is not a problem. Since the compressor is operated at full speed to increase heating/cooling capacity when staring operation, it gets louder.

Q21 The noise of the outdoor unit changes from time to time.

A21 This is not a problem. The speed of the compressor varies depending of the temperature difference between the preset temperature of the thermostat and the room temperature.

Q22 The room temperature differs from the preset temperature set by the room temperature control.

A22 The room temperature may differ from the preset temperature due to the structure of the room, air flow condition, etc.
If there is a difference, adjust the preset temperature to obtain the optimum room temperature.

Q23 The air does not come out immediately after starting operation.

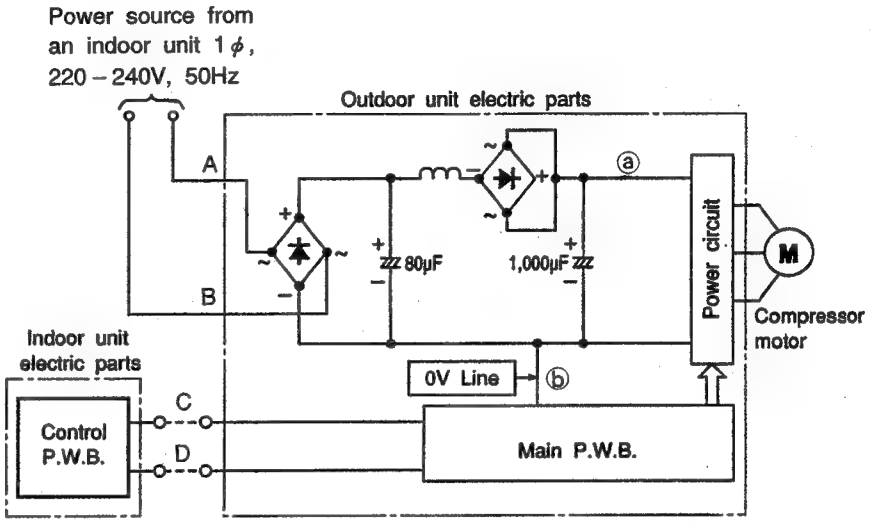
A23 After the power is turned on, when the heating or dehumidifying operation is set, the unit performs heat-running operation for 1 minute. In the heating operation, the operation lamp blinks for this period. It is not a malfunction.

TROUBLE SHOOTING

MODEL RAS-25CNH1/RAC-25CNH1

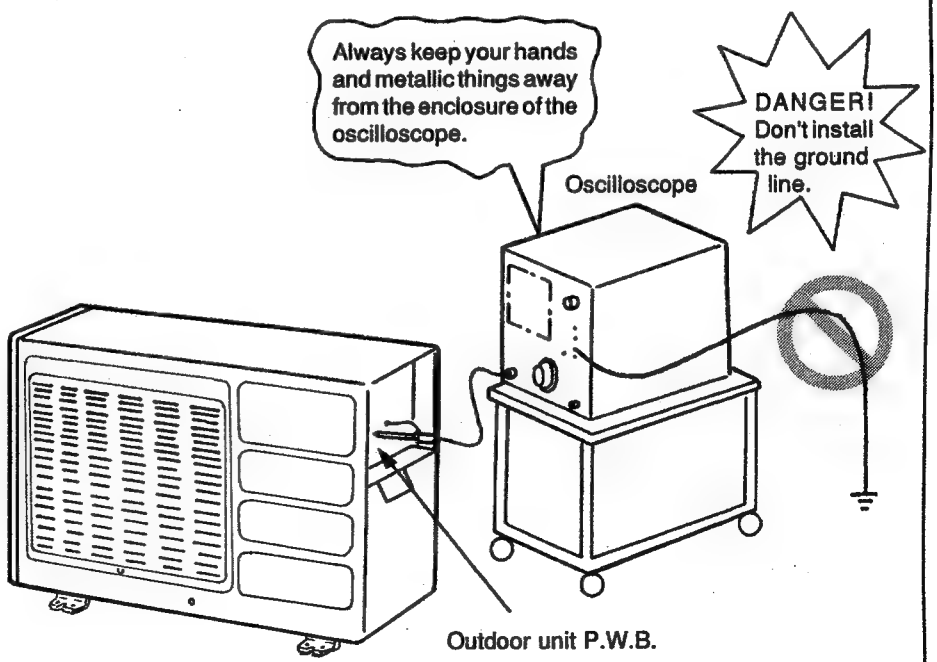
PRECAUTIONS FOR CHECKING

1. Remember that the 0V line is biased to 155 – 170V in reference to the ground level.
2. Also mote that it takes about 10 minute until the voltages fall after the power switch is turned off.



Across ⓐ – ⓑ (0V line) ---------- approx. 310 – 340V
Across ⓐ – ground ---------- approx. 155 – 170V
Across ⓑ (0V line)-ground ------- approx. 155 – 170V

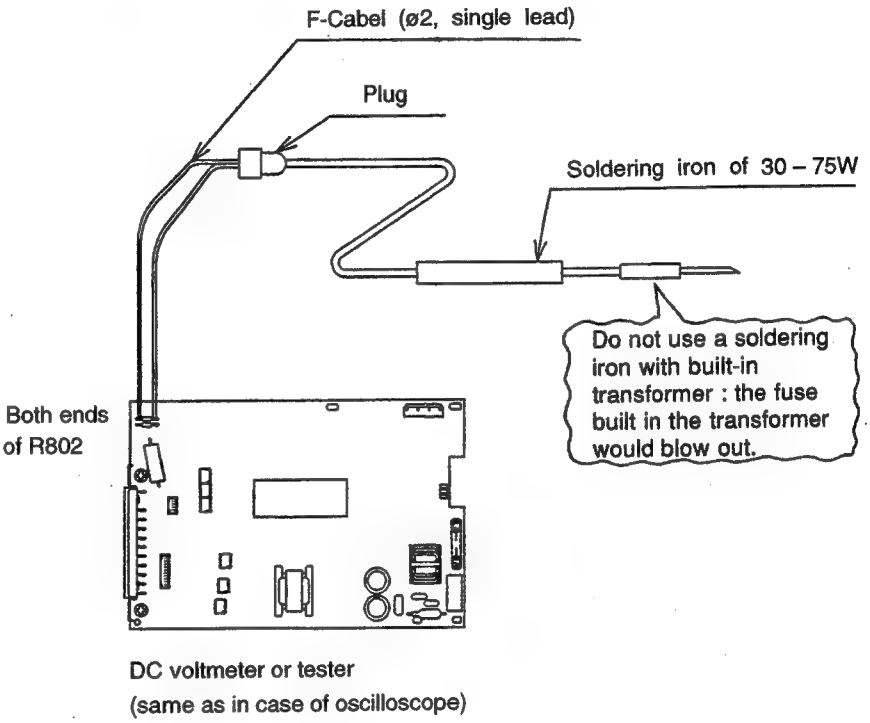
When using an oscilloscope, never ground it. Don't forget that high voltages as noted above may apply to the oscilloscope.



DISCHARGING CAPACITORS

1. Turn off the indoor unit's power switch or unplug the power cord, and wait for a minute or so.
2. Open the cover of the electric parts compartment. Discharge electricity from smoothing capacitors (1,000μF) by connecting the leads of a soldering iron of 30 – 75W to the terminals provided for this purpose. Continue discharging for more than 15 seconds.

The smoothing capacitors (1,000μF) are charged to about 340V. Don't forget to discharge them before attempting access to electric parts.



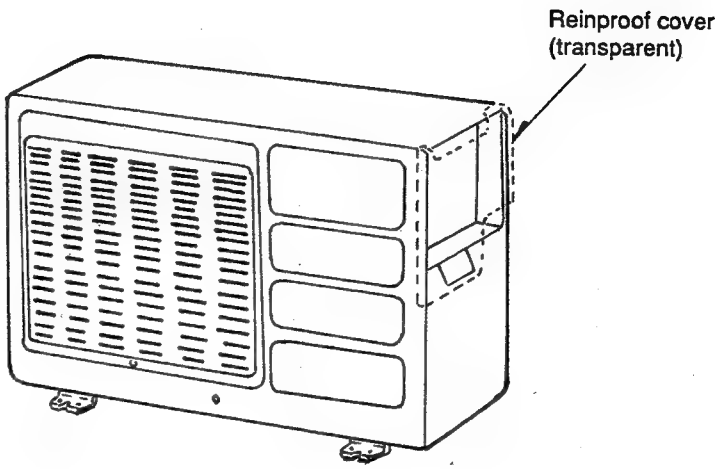
CUTTING OFF POWER SUPPLIED TO THE POWER CIRCUIT

Before checking electric parts of the outdoor unit, disconnect the power line of the power circuit to cut off supply power. This is necessary to protect the parts.

Remove the receptacle of the gray/brown lead wire connected to the smoothing capacitor from control P.W.B. before performing operation check of each point in the circuit.

When checking conductivity at each point of circuit in electrical parts of outdoor unit, to prevent secondary trouble, disconnect gray/black lead wire connected to smoothing capacitor from control P.W.B. in order to shut off power to the power module before checking. Connect (+) side of C516 and 5V using clip at this time. If this is not done, there will be no drive output. (LED310 blinking 10 times mode is set.)

Be sure to replace the rainproof cover after checking (rainwater would enter if it is not installed).



CHECKING THE INDOOR UNIT/OUTDOOR UNIT ELECTRICAL PARTS AND REFRIGERATING CYCLE

[MODEL RAS-25CNH1/RAC-25CNH1]

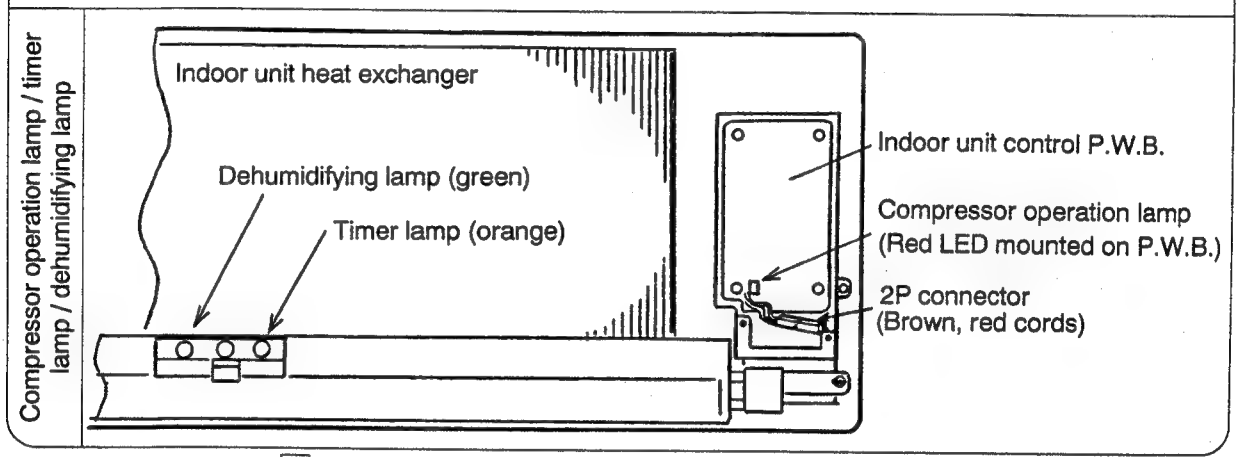
1. Indoor unit electrical parts (Judging between "indoor unit" and "outdoor unit")

Is the timer lamp or dehumidifying lamp blinking?

YES → See "Troubleshooting when the timer and dehumidifying lamp blinks".

NO ↓

Remove the front cover and electric box lid.



Set the room temperature to 16°C in the cooling operation mode or to 32°C in the heating operation mode. Then, press the operation button.

Does the compressor operation lamp light?

NO → Remove the 2P connector (brown, red cords) connecting the terminal board and the control P.W.B., and measure the voltage between the brown and red cords coming from the terminal board. (Tester: DC range, brown side ⊕, red side ⊖).

YES ↓

Does the compressor operation lamp turn OFF about 10 seconds after it lights?

YES → Check the outdoor unit.

NO ↓

When the outdoor compressor operates, the electrical parts are normal. Check the refrigerating cycle.

Is a DC voltage of approx. 35V generated?
After measurement is completed, connect the 2P connector again.

YES → Check the electrical parts in the indoor unit.

NO ↓

Check that the F cable is connected correctly and also check there is no disconnection.

Connection is normal. → Check the outdoor unit.

TROUBLE SHOOTING WHEN THE TIMER and DEHUMIDIFYING LAMP BLINKS

MODEL RAS-25CNH1

Perform trouble shooting according to the number of times the timer lamp on the display of the indoor unit blinks.

No.	Blinking mode of timer lamp	Reason of indication	Possible caues
1	5 sec. ▮▯ ---------- 1 time	Reversing valve defective When the indoor heat exchanger temperature is too low in the heating mode or it is too high in the cooling mode.	(1) Reversing valve defective (2) Heat exchanger thermistor disconnected (only in the heating mode).
2	5 sec. ▮▮▯ -------- 2 times	Outdoor unit forced operation When the outdoor unit is in forced operation or balancing operation after forced operation.	Electrical parts in the outdoor unit.
3	5 sec. ▮▮▮▯ ------ 3 times	Indoor unit/outdoor unit interface defective When the interface signal from the outdoor unit is interruppted.	(1) Indoor unit interface circuit (2) Outdoor unit interface circuit
4	5 sec. ▮▮≈▮▯ -- 10times	Over-current detection at the DC fan motor When over-current is detected at the DC fan motor of the indoor unit.	(1) Indoor unit fan lock (2) Indoor unit fan motor (3) Indoor unit control P.W.B.
5	5 sec. ▮▮≈▮▯ -- 13 times	IC401 data reading error When data read from IC401 is incorrect.	IC401 abnormal

(▮ -- lights for 0.5 sec. at intervals of 0.5 sec.)

Perform trouble shooting according to the number of times the dehumidifying lamp on the display of the indoor unit blinks.

No.	Blinking mode of Dehumidifying lamp	Reason of indication	Possible caues
1	5 sec. ▮▮▯ -------- 2 times	Peak current cut off	Check the outdoor unit referring to the lighting mode table of the self-diagnosis lamp.
2	5 sec. ▮▮▮▯ ------ 3 times	Abnormal low rotation speed	
3	5 sec. ▮▮▮▮▯ ---- 4 times	Switching failure	
4	5 sec. ▮▮▮▮▮▯ -- 5 times	Over load lower limit cut off	
5	5 sec. ▮▮≈▮▯ -- 7 times	Outdoor thermisor abnormal	
6	5 sec. ▮▮≈▮▯ -- 8 times	Acceleration defective	

(▮ -- lights for 0.5 sec. at intervals of 0.5 sec.)

⚠ CAUTION

(1) If the interface circuit is defective when the power is turned ON, the self-diagnosis indication is not displayed.
(2) When indoor unit is performing self-diagnosis operation shown above, self-diagnosis lamp of the outdoor unit blinks 9 times.
(3) If the indoor unit cannot be operated at all, check the connection of the F cable (reverse connection or disconnection).
(4) When timer lamp or dehumidifying lamp blinks, remote control can be used to operate for checking operation once again.

Fan Motor Set Wind Volocity and DC Voltage (between blue and red) characteristics.

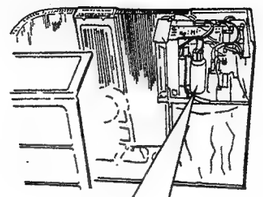
Mode		Fan speed	Connector blue - red voltage (V)	Rotation speed (min^{-1})
Indoor fan speed	Heating	SUPER LO SS	8.8	500
		LO S	16.4	960
		OVER LOAD	18.4	1000
		MED Lo	20.9	1140
		Hi Hi	27.1	1350
		SUPER Hihi	35.0	1560
	Cooling	LO S	14.3	860
		MED Lo	16.6	970
		Hi Hi	18.5	1040
		SUPER Hihi	18.5	1040
	Dehumidifying	Lo S	14.3	800

2. Outdoor unit (judging between "electrical parts of the condensing unit" and "refrigerating cycle")

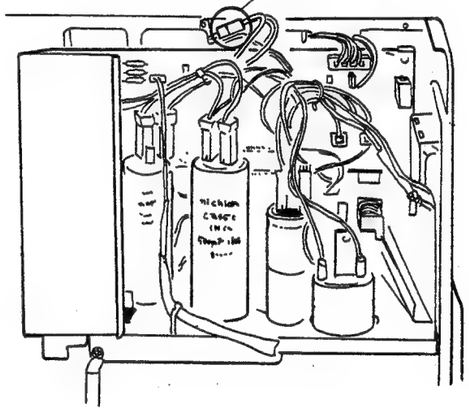
〔MODEL RAC−25CNH1〕

Remove the compressor Connecting connector.

Compressor terminal board and self-diagnosis lamp.



Compressor connecting connector.



If checking cannot be done the first time, wait for 3 min. as it is (3 min later re-start), check the lighting condition of the self-diagnosis lamp again.

Set to the operation mode and press the start ／ stop Switch. Does the operation starts about 1 min or more ? (LD 303 lights, is mormal)

Yes

- Check the drive circuit using the drive checker.
- Power module
- Check the position detection circuit.

Normal

(3) Check the Refrigerating cycle.

No

Check the electrical parts in the condensing unit.

(MODEL RAC-25CNH1)

SELF-DIAGNOSIS LIGHTING MODE ■: LIT ▨: BLINKING □: OFF

LD301 RED	LD302 RED	SELF-DIAGNOSIS NAME	DETAILS	MAIN CHECK POINT
		[1] DURING OPERATION	LD303 (RED) LIGHTS. ■	
□	□	NORMAL OPERATION	COMPRESSOR OPERATION	NOT MALFUNCTION
■	□	OVERLOAD (1)	ROTATION SPEED (1) (2) SET VALUE (3) TIME THE ROTATION SPEED IS AUTOMATICALLY CONTROLLED TO PROTECT THE COMPRESSOR IN THE OVERLOAD CONDITION.	THIS SHOWS AN OVERLOAD. NOT MALFUNCTION.
□	■	OVERLOAD (2)		
■	■	OVERLOAD (3)		
□ BLINKING	▨	SERVICE OPERATION	ONLY BLINKS WHEN LOW FREQUENCY SYNC STARTS IN THE FORCED COOLING OPERATION.	①INTERFACE CIRCUIT ②OUTDOOR P.W.B. ③SERVICE SWITCH
		※TURNING ON AND OFF ARE REPEATED AT BLINKING INTERVAL OF 0.25 SEC. IN BLINKING.		
		[2] DURING STOP	LD303 (RED) GOES OFF. □	
□	□	NORMAL STOP	INDOOR THERMOSTAT OFF. MAIN OPERATION OFF.	NOT MALFUNCTION.
▨ 1 TIME	□	RESET STOP	WHEN STOPPED WITH POWER RESET. (NORMAL WHEN POWER HAS BEEN TURNED ON.)	CONTROL P.W.B. (POWER CIRCUIT. MICROCOMPUTER. ETC.)
▨ 2 TIMES	□	PEAK CURRENT CUT	OVERCURRENT IS DETECTED.	①POWER MODULE ②COMPRESSOR ③CONTROL P.W.B.
▨ 3 TIMES	□	ABNORMAL LOW SPEED ROTATION	POSITION DETECTION SIGNAL IS NOT INPUT DURING OPERATION.	①POWER MODULE ②COMPRESSOR ③CONTROL P.W.B. (DRIVE CIRCUIT. POSITION DETECTION CIRCUIT. ETC.)
▨ 4 TIMES	□	SWITCHING FAILURE	SWITCHING FROM LOW FREQUENCY SYNC START TO POSITION DETECTION OPERATION FAILURE.	①POWER MODULE ②COMPRESSOR ③CONTROL P.W.B. (DRIVE CIRCUIT. POSITION DETECTION CIRCUIT. ETC.)
▨ 5 TIMES	□	OVERLOAD LOWER LIMIT CUT	UNDER THE LOWER LIMIT OF ROTATION SPEED WITH OVERLOAD CONTROL CIRCUIT OPERATED.	①OUTDOOR UNIT IS EXPOSED TO DIRECT SUNLIGHT OR ITS AIRFLOW BLOCKED. ②FAN MOTOR ③FAN MOTOR CIRCUIT
▨ 6 TIMES	□	OH, FIN THERMISTOR TEMP. RISE	OH THERMISTOR OR FIN THERMISTOR IS OPERATED.	①LEAK OF REFRIGERANT ②COMPRESSOR ③THERMISTOR CIRCUIT(OH)
▨ 7 TIMES	□	THERMISTOR ABNORMAL	THERMISTOR IS OPEN OR SHORTED. (OH, OUTER TEMPERATURE. DEF. THERMISTOR)	①THERMISTOR ②CONNECTION OF THERMISTOR DEFECTIVE ③THERMISTOR CIRCUIT
▨ 8 TIMES	□	ACCELERATION DEFECTIVE	NO ACCELERATION OVER THE LOWER LIMIT OF THE ROTATION SPEED.	①LEAK OF REFRIGERANT ②COMPRESSOR
▨ 9 TIMES	□	COMMUNICATIONS ERROR	COMMUNICATIONS STOPPED.	①INCORRECT CONNECTION OF CABLES ②DISCONNECTION OF CABLE ③INDOOR/OUTDOOR INTERFACE CIRCUIT
▨ 10 TIMES	□	ABNORMAL POWER VOLTAGE	POWER VOLTAGE IS ABNORMALLY LOW.	①POWER VOLTAGE ②CONNECTION OF REACTOR

※EXAMPLE OF BLINKING (5 TIMES) 2 SEC. ■···LIGHTS FOR 0.25 SEC AT INTERVAL OF 0.25 SEC.

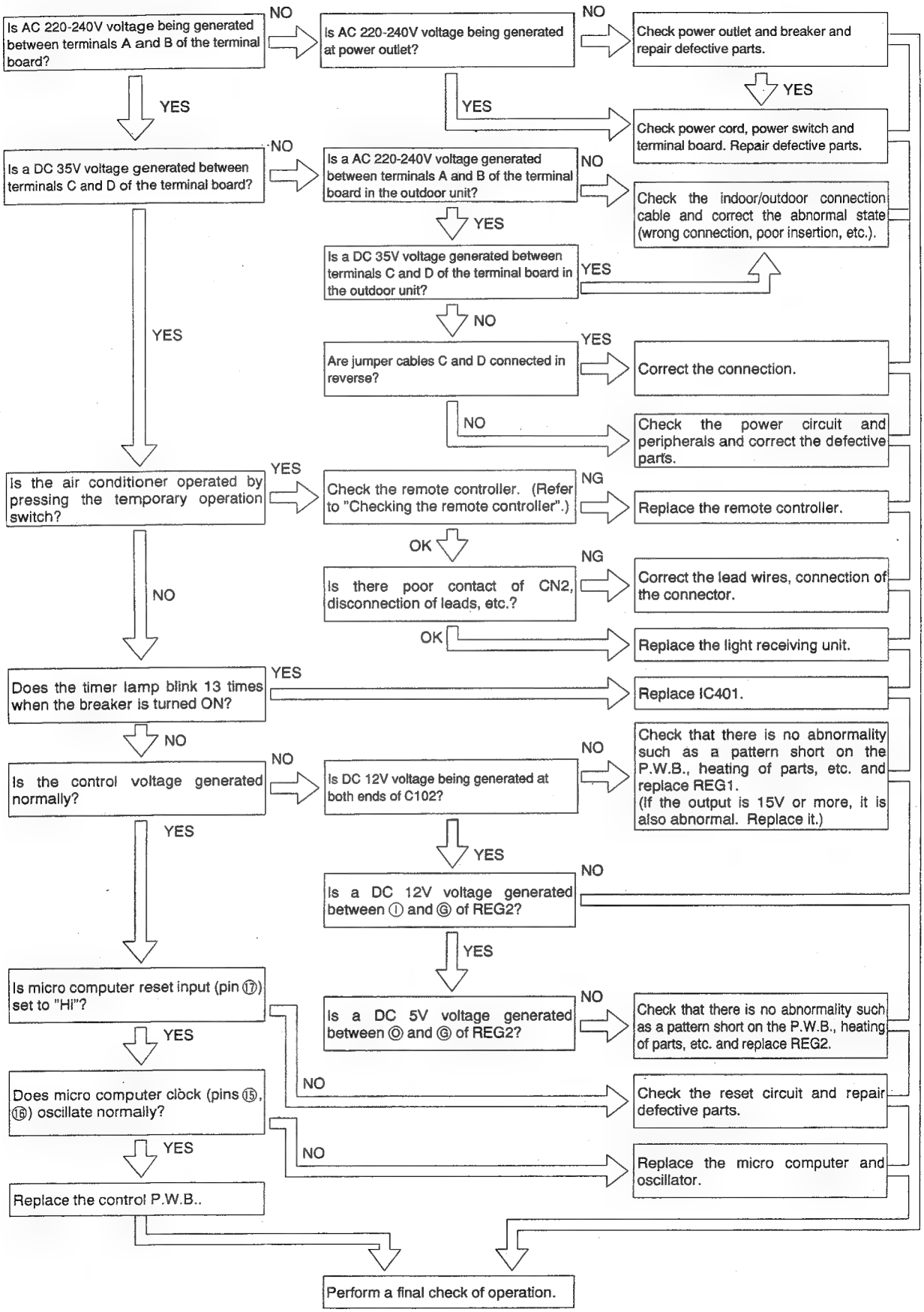
(3) LIGHTING MODE IN THE OPERATION WITH COMPRESSOR LEAD DISCONNECTED

(1) DISCONNECT THE CONNECTORS OF THE LEAD CONNECTED TO THE COMPRESSOR.
(2) SET TO THE OPERATION MODE AND PRESS THE START/STOP SWITCH.
(3) WHEN THE OPERATION ABOUT 1min. NORMALLY (LD 303 LIGHTS), THE ELECTRICAL PARTS IN THE OUTDOOR UNIT (ESPECIALLY POWER MODULE) CAN BE THOUGHT TO BE NORMAL.

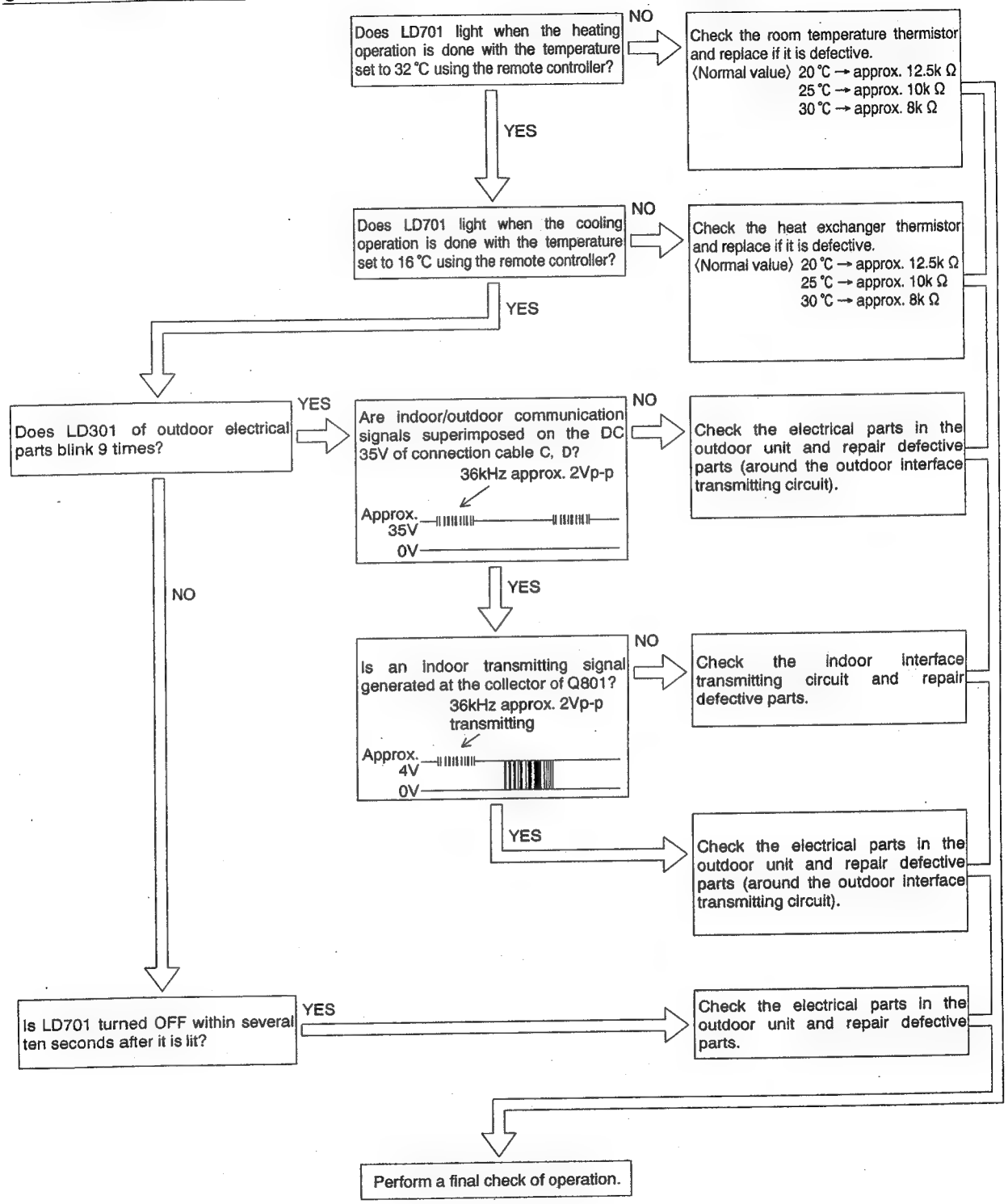
SERVICE OPERATION: TO COLLECT REFRIGERANT OR TO OPERATE OUTDOOR UNIT INDEPENDENTLY, TURN OFF POWER SWITCH OF THE INDOOR UNIT ONCE, THEN TURN OFF AGAIN AND SET THE SERVICE SWITCH TO COOL SIDE. (COOLING CYCLE IS SET.)
TO OPERATE UNIT AGAIN, BE SURE TO RETURN SERVICE SWITCH TO NORMAL, AND TURN OFF POWER SWITCH, THEN TURN IT ON AGAIN.

CAUTION: BE SURE TO CHECK THAT POWER SWITCH IS TURNED OFF BEFORE SERVICING.

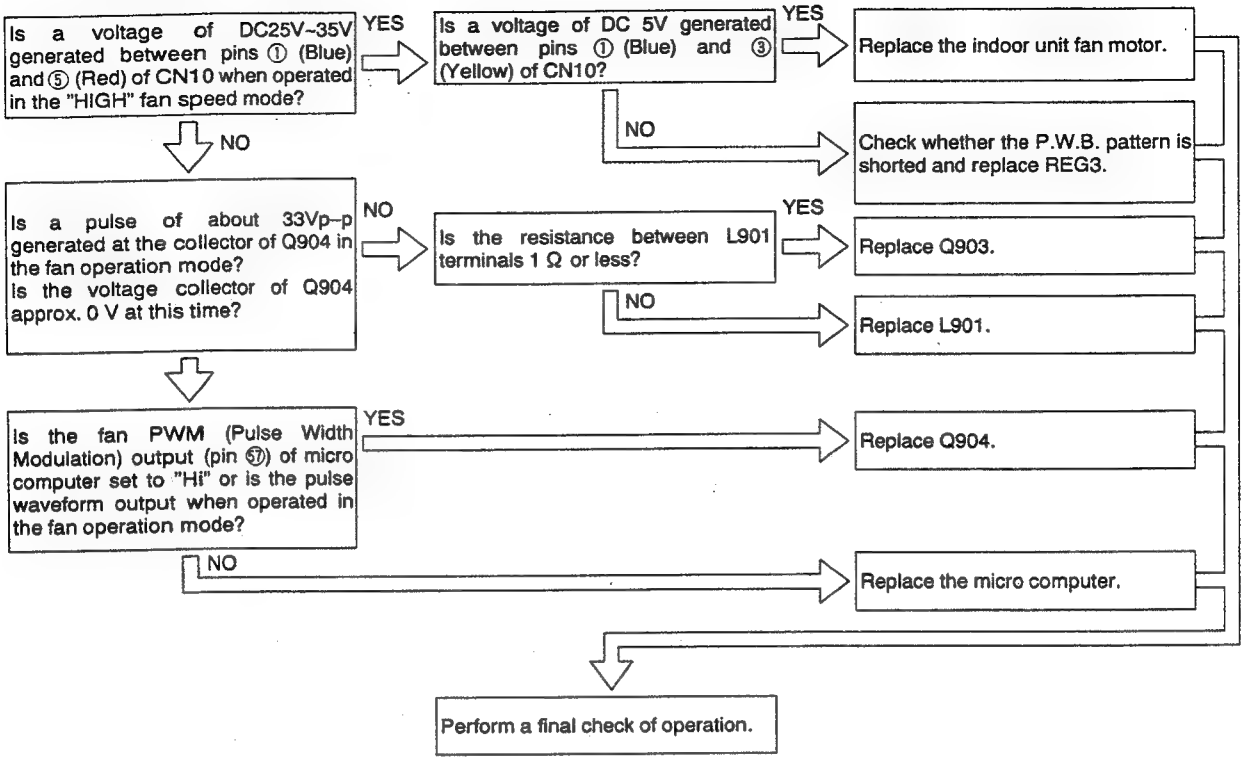
(NOTE 1)
LD301 BLINKING 9 TIMES MODE OCCURS NOT ONLY BECAUSE OF COMMUNICATIONS ERROR, BUT ALSO WHEN FALL SIGNAL IS SENT TO INDOOR UNIT ▮ TIMES WITHIN 30 MINUTES. CHECK WHETHER OR NOT DEHUMIDIFYING LAMP ON INDOOR UNIT IS BLINKING.


Is AC 220-240V voltage being generated between terminals A and B of the terminal board?
NO
Is AC 220-240V voltage being generated at power outlet?
NO
Check power outlet and breaker and repair defective parts.
YES
YES
YES
Check power cord, power switch and terminal board. Repair defective parts.
Is a DC 35V voltage generated between terminals C and D of the terminal board?
NO
Is a AC 220-240V voltage generated between terminals A and B of the terminal board in the outdoor unit?
NO
Check the indoor/outdoor connection cable and correct the abnormal state (wrong connection, poor insertion, etc.).
YES
Is a DC 35V voltage generated between terminals C and D of the terminal board in the outdoor unit?
YES
YES
NO
Are jumper cables C and D connected in reverse?
YES
Correct the connection.
NO
Check the power circuit and peripherals and correct the defective parts.
Is the air conditioner operated by pressing the temporary operation switch?
YES
Check the remote controller. (Refer to "Checking the remote controller".)
NG
Replace the remote controller.
OK
NO
Is there poor contact of CN2, disconnection of leads, etc.?
NG
Correct the lead wires, connection of the connector.
OK
Replace the light receiving unit.
Does the timer lamp blink 13 times when the breaker is turned ON?
YES
Replace IC401.
NO
Is the control voltage generated normally?
NO
Is DC 12V voltage being generated at both ends of C102?
NO
Check that there is no abnormality such as a pattern short on the P.W.B., heating of parts, etc. and replace REG1.
(If the output is 15V or more, it is also abnormal. Replace it.)
YES
YES
Is a DC 12V voltage generated between ① and ⑥ of REG2?
NO
YES
Is micro computer reset input (pin ⑰) set to "Hi"?
Is a DC 5V voltage generated between ⑳ and ⑥ of REG2?
NO
Check that there is no abnormality such as a pattern short on the P.W.B., heating of parts, etc. and replace REG2.
YES
Does micro computer clock (pins ⑮, ⑯) oscillate normally?
NO
Check the reset circuit and repair defective parts.
YES
NO
Replace the micro computer and oscillator.
Replace the control P.W.B..
Perform a final check of operation.

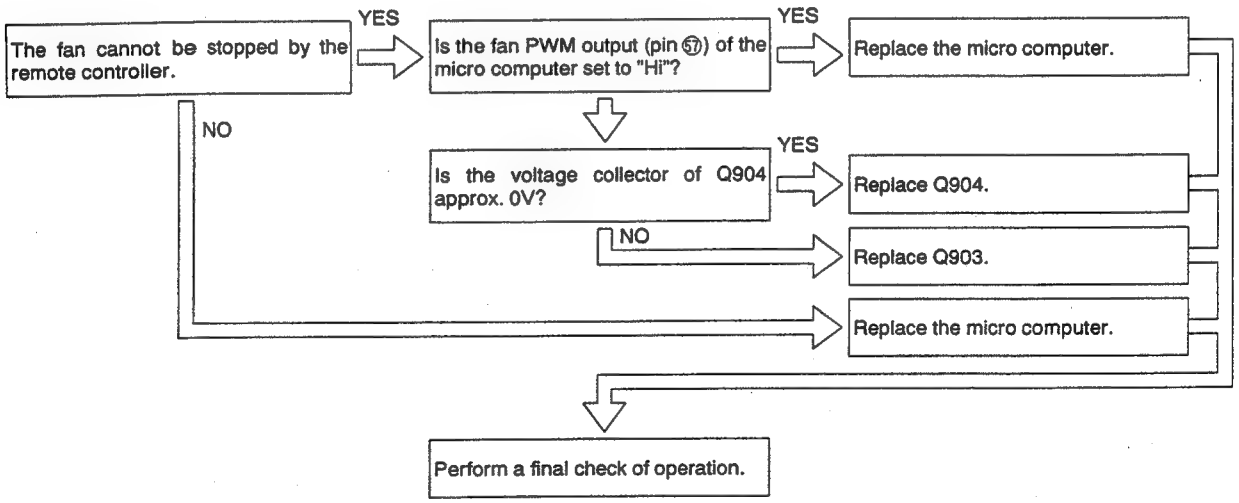
3. The outdoor unit does not operate (remote control command can be received).



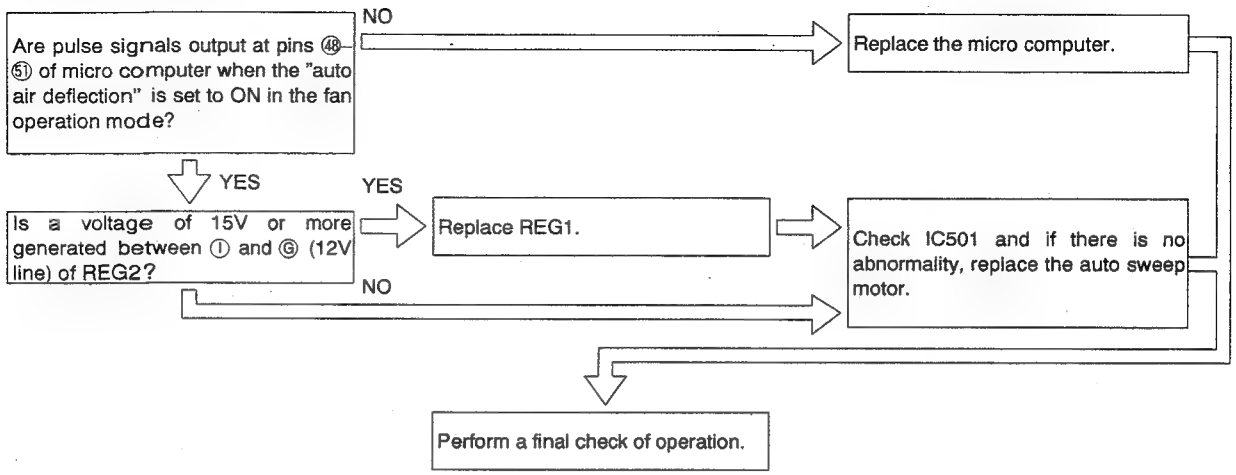
4. Only the indoor unit fan does not operate (other functions are normal).



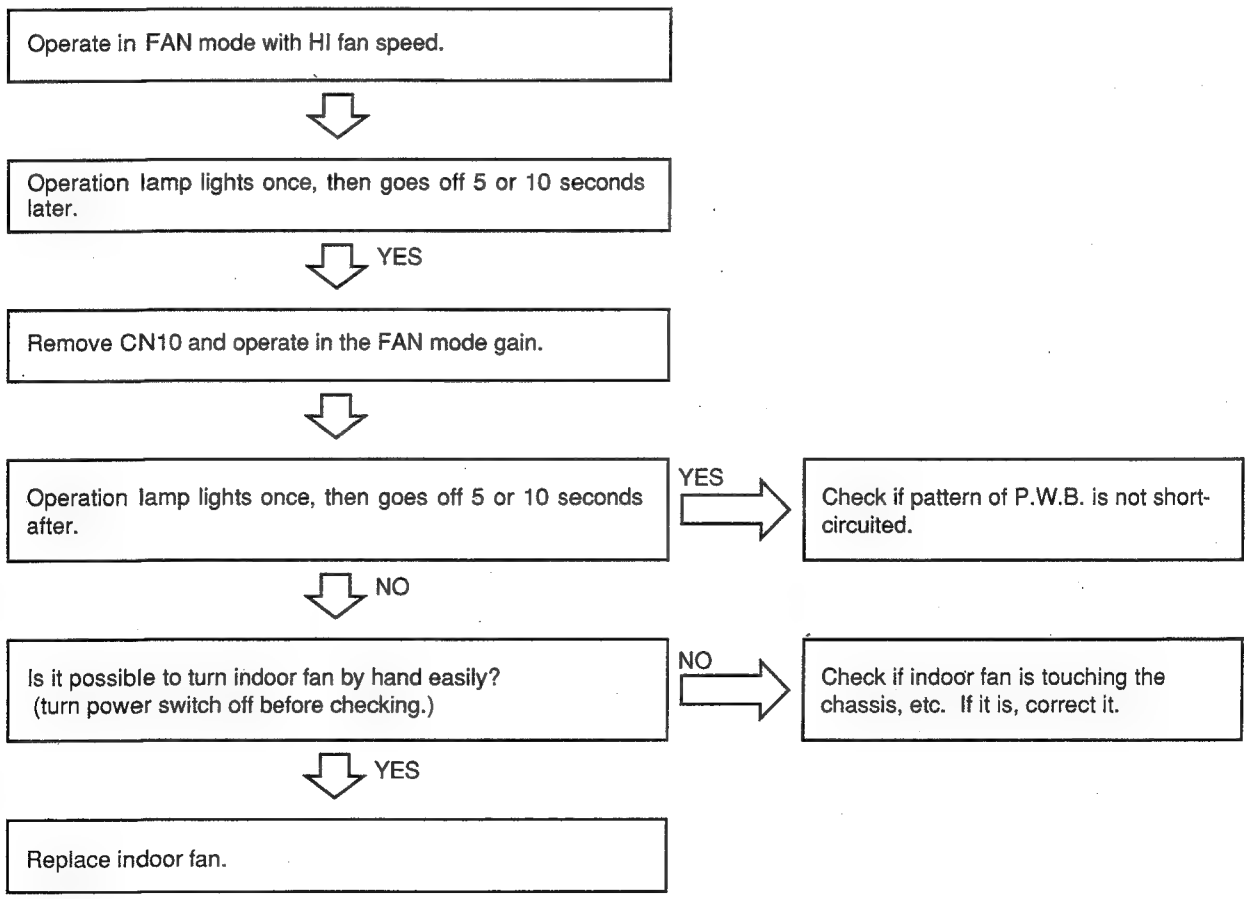
5. The fan speed of the indoor unit fan cannot be changed (other functions are normal)



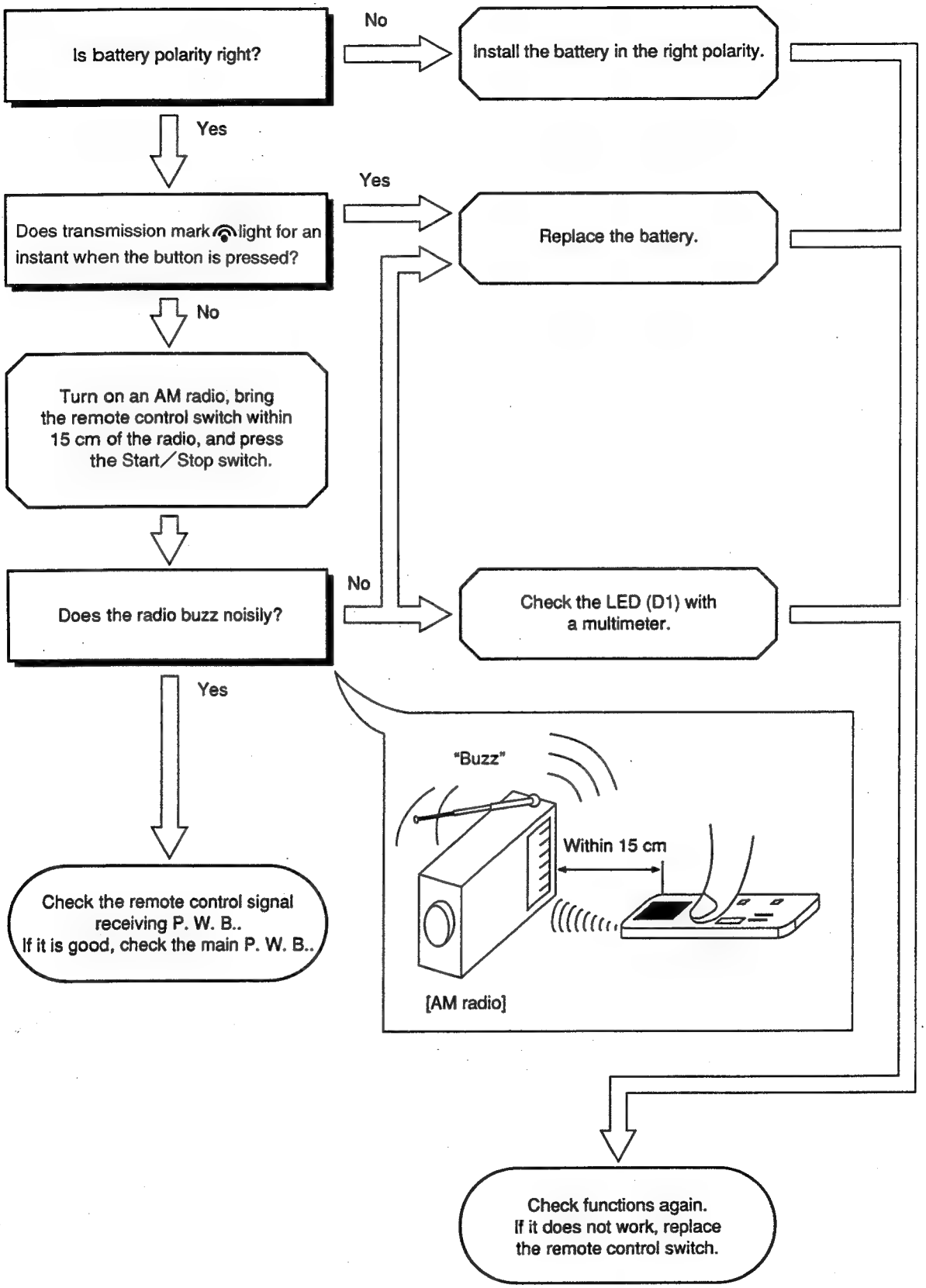
6. The air deflector cannot be moved (other functions are normal)



7. Operation completely stops within a few seconds minutes after starting. (All displays also go off.)



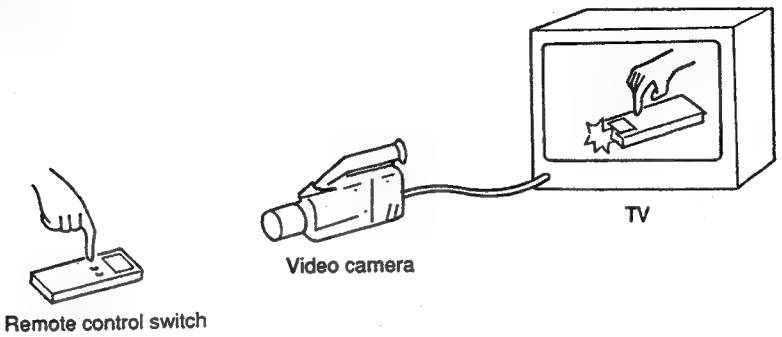
CHEKCING THE REMOTE CONTROL SWITCH



You can check the remote control switch by other methods as explained below.

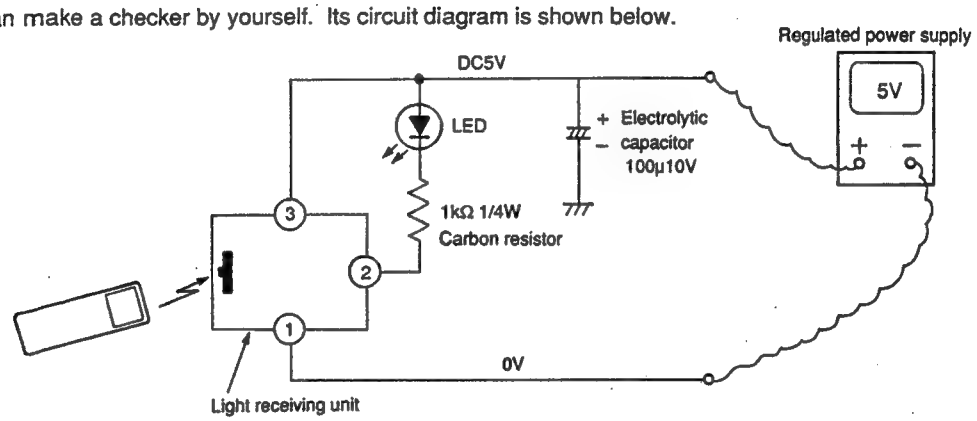
(1) Using a video monitor

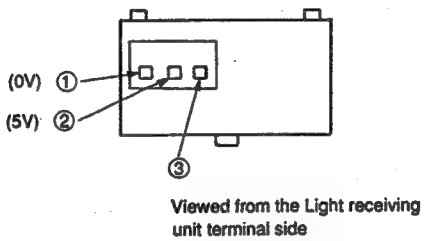
Connect a video camera to a TV and aim at the remote control switch. If infrared rays are emitted from the switch, you will see a flash in violet on the monitor screen.



(2) Using a checker

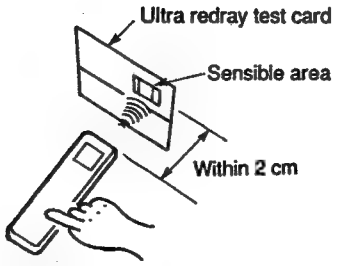
You can make a checker by yourself. Its circuit diagram is shown below.





Viewed from the Light receiving unit terminal side

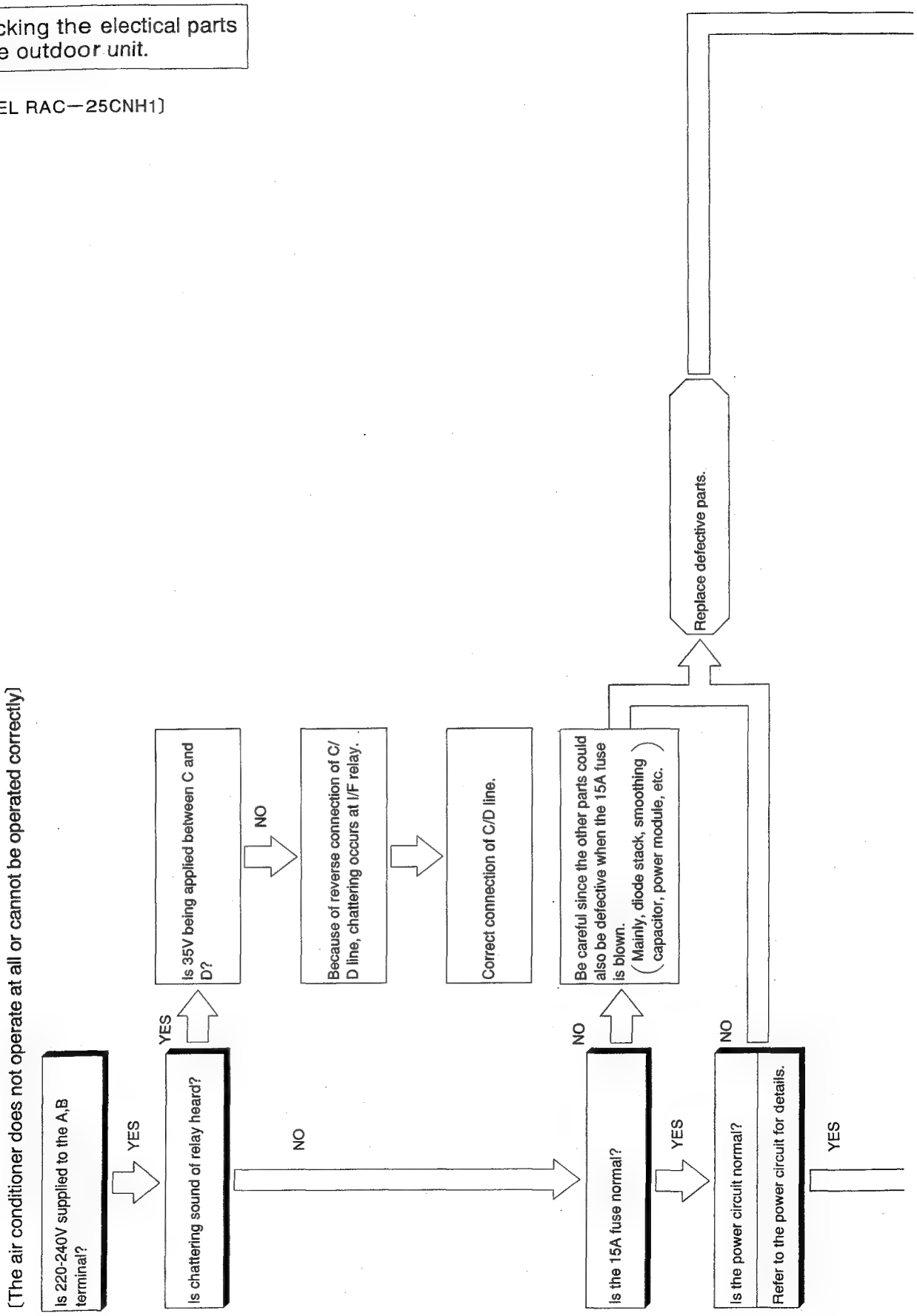
(3) Using the test card

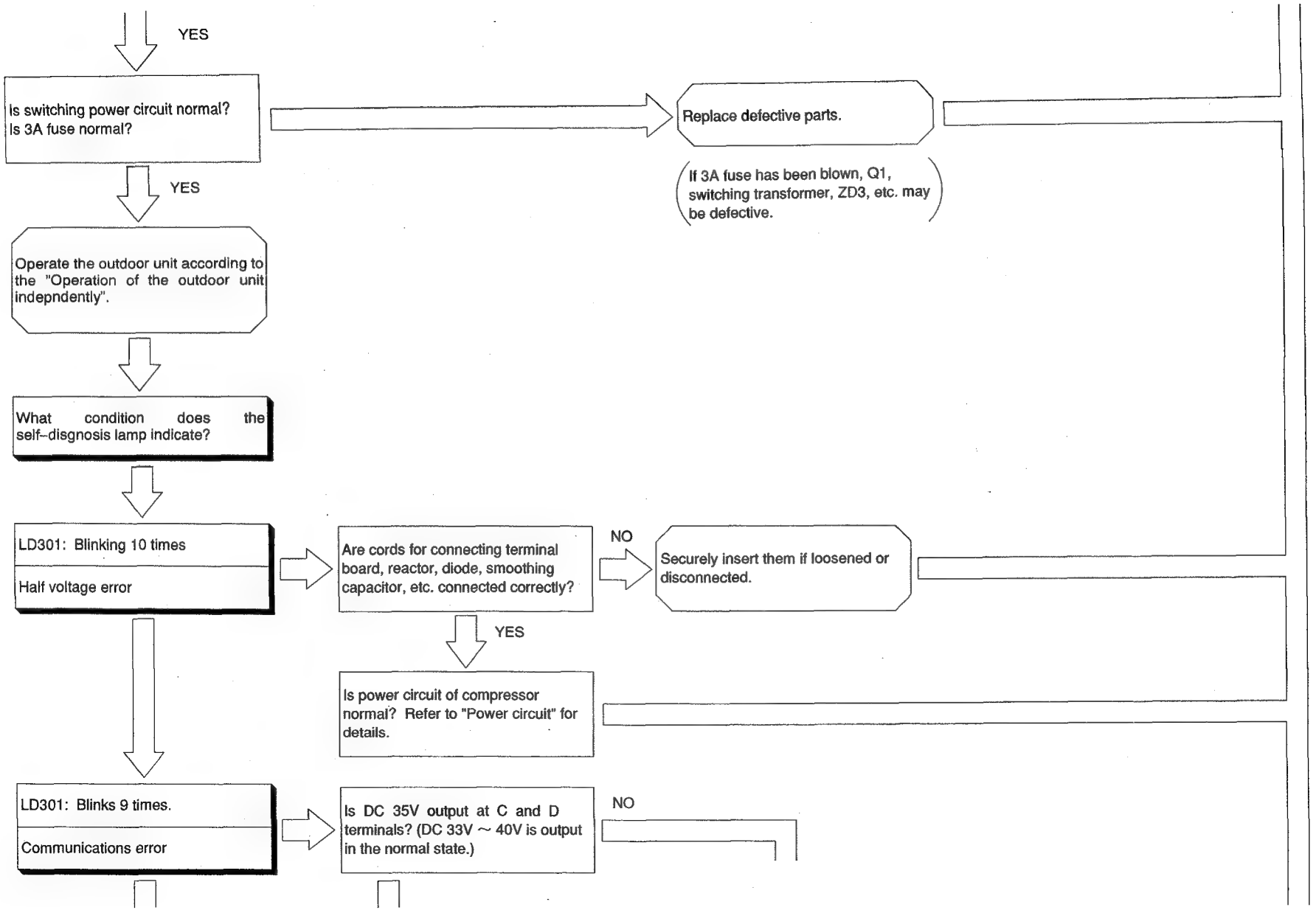


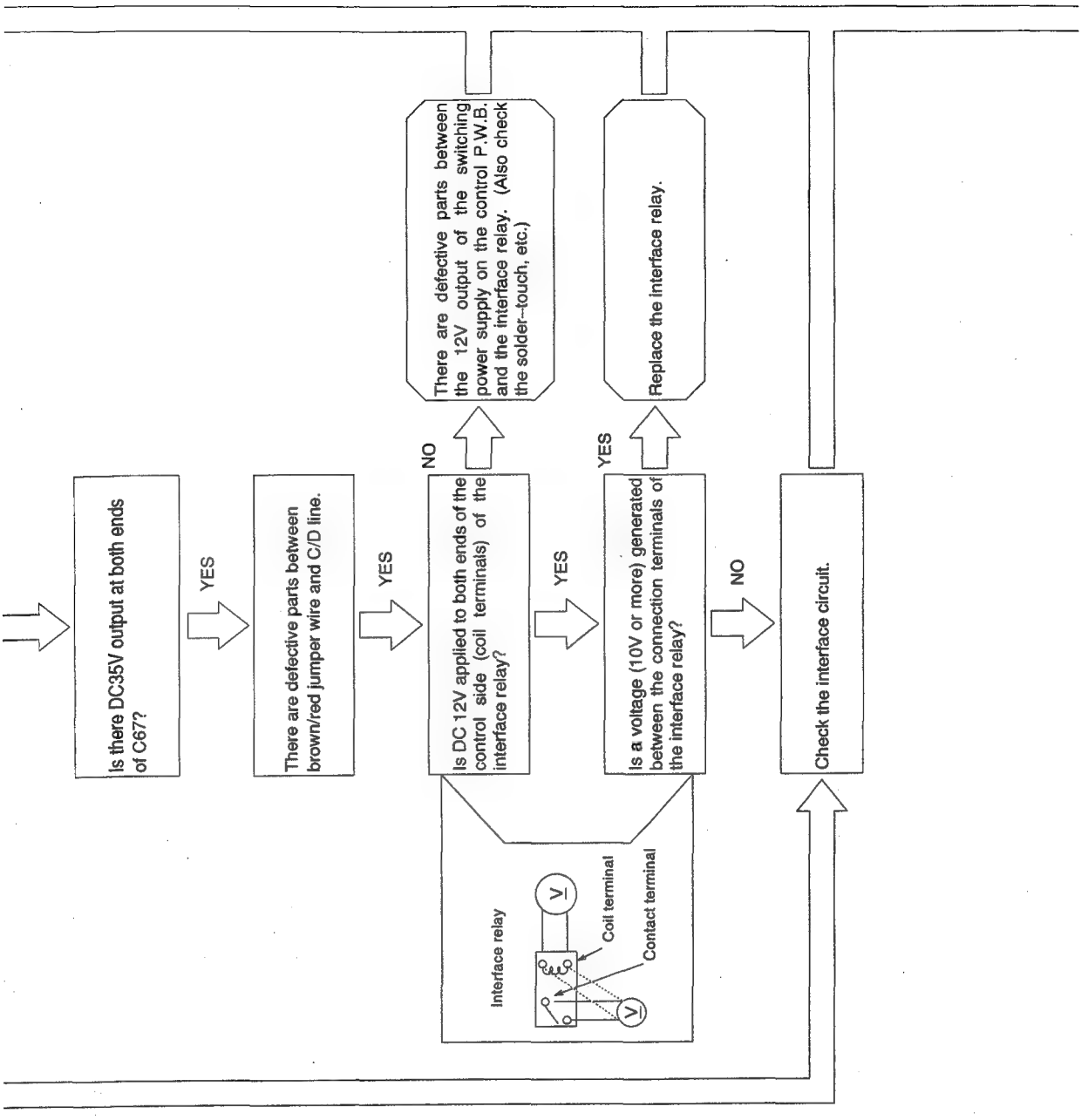
The sensible area should flash in orange when you operate the remote control unit if it is good.

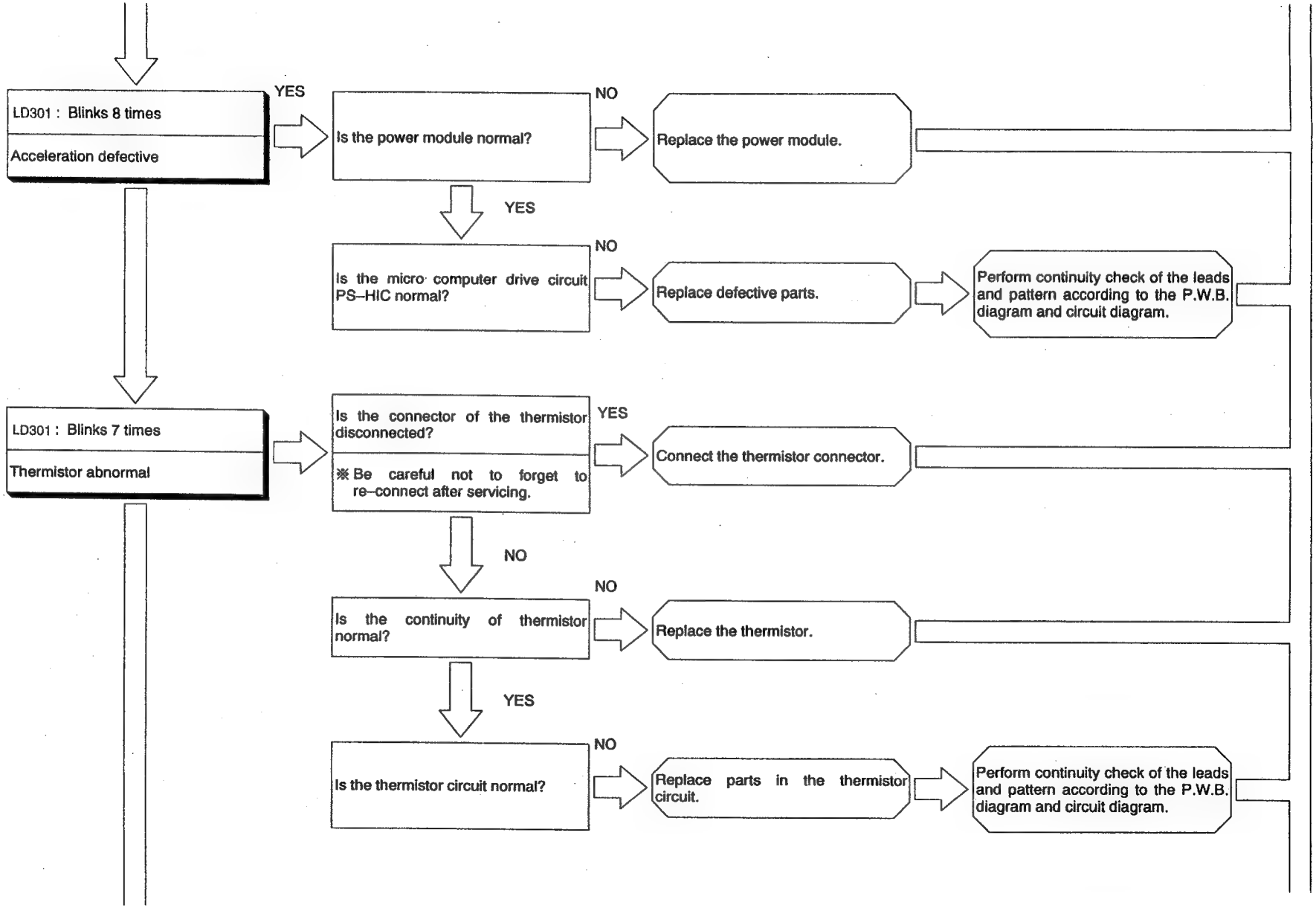
Checking the electical parts in the outdoor unit.

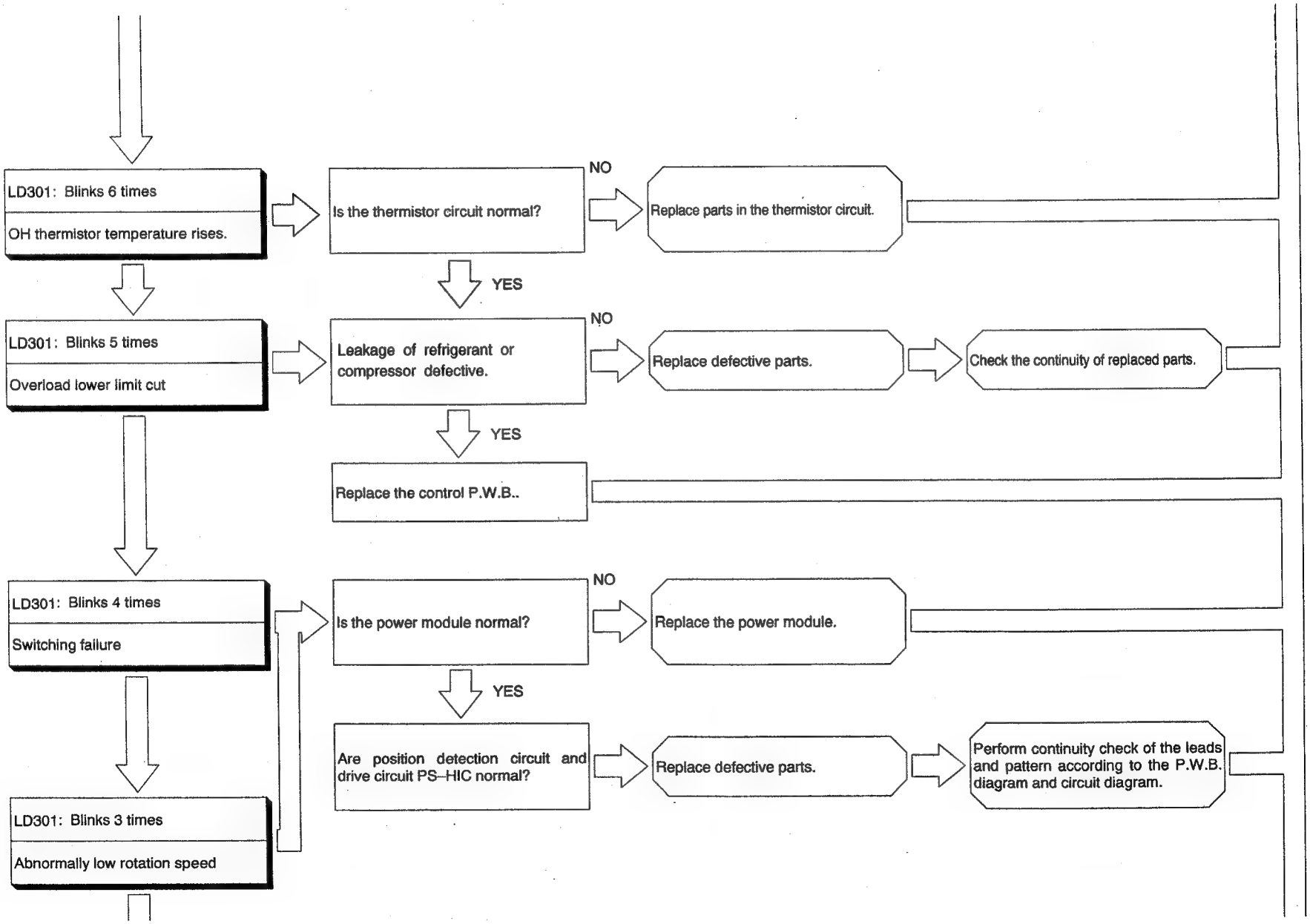
〔MODEL RAC—25CNH1〕

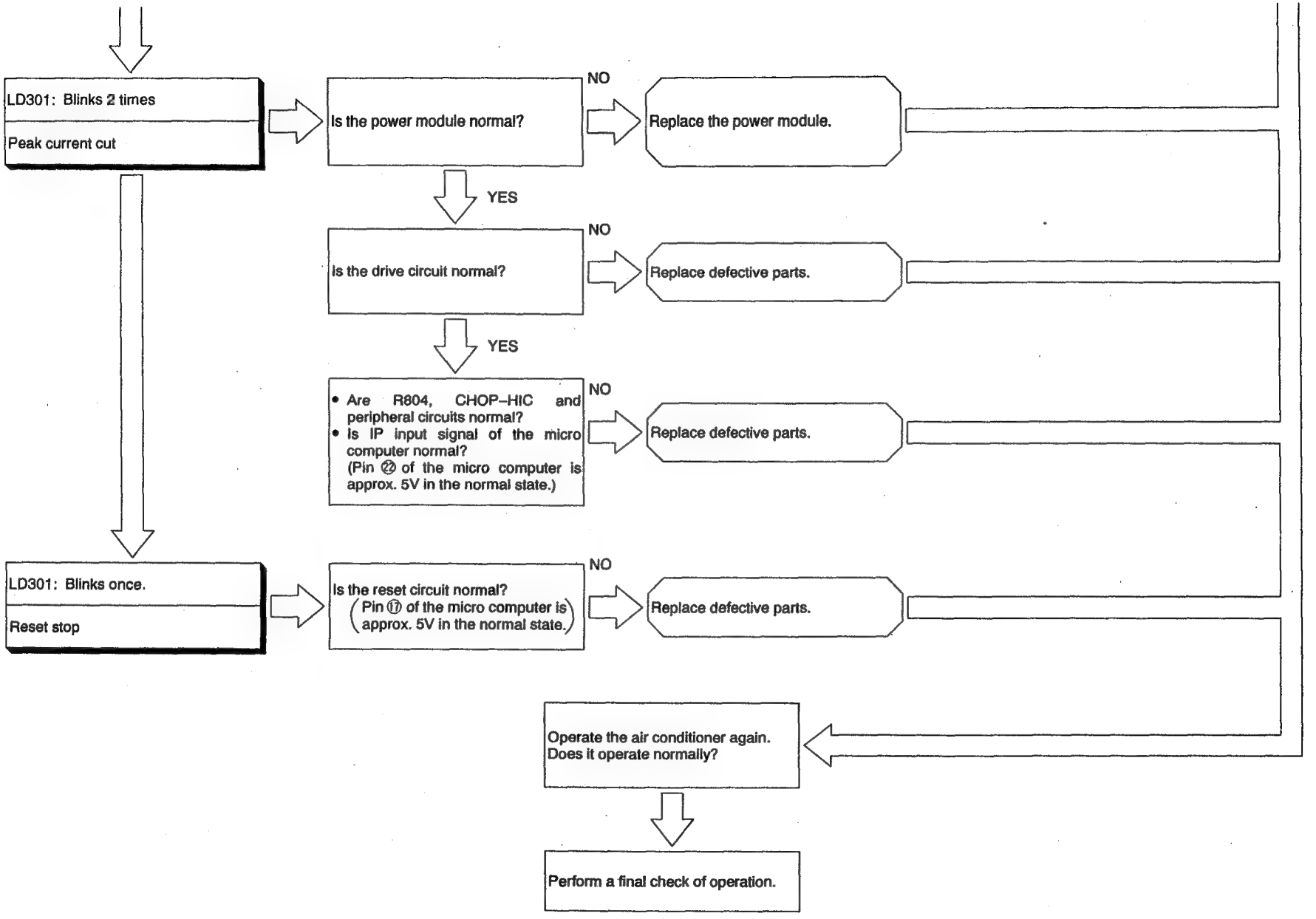



YES
Is switching power circuit normal?
Is 3A fuse normal?
Replace defective parts.
If 3A fuse has been blown, Q1, switching transformer, ZD3, etc. may be defective.
YES
Operate the outdoor unit according to the "Operation of the outdoor unit indepndently".
What condition does the self-disgnosis lamp indicate?
LD301: Blinking 10 times
Half voltage error
Are cords for connecting terminal board, reactor, diode, smoothing capacitor, etc. connected correctly?
NO
Securely insert them if loosened or disconnected.
YES
Is power circuit of compressor normal? Refer to "Power circuit" for details.
LD301: Blinks 9 times.
Communications error
Is DC 35V output at C and D terminals? (DC 33V ~ 40V is output in the normal state.)
NO

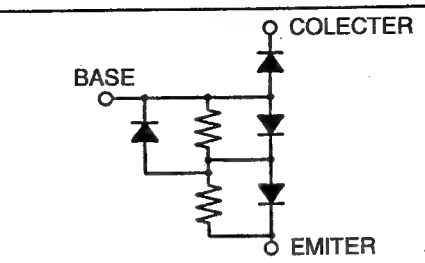
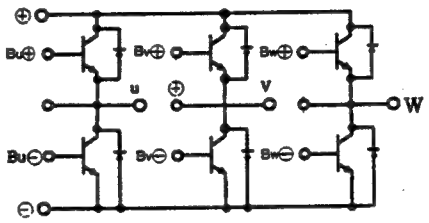
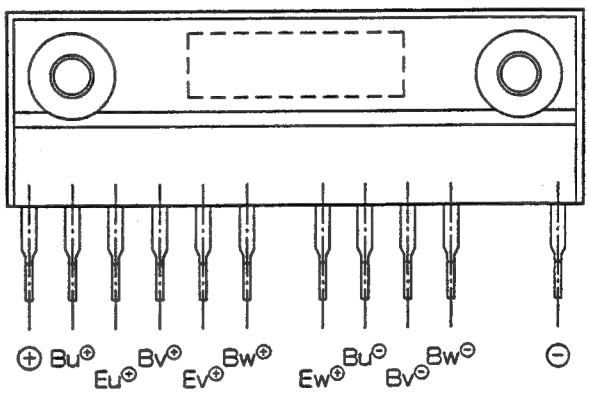

Is there DC35V output at both ends of C67?
YES
There are defective parts between brown/red jumper wire and C/D line.
YES
Is DC 12V applied to both ends of the control side (coil terminals) of the interface relay?
NO
There are defective parts between the 12V output of the switching power supply on the control P.W.B. and the interface relay. (Also check the solder-touch, etc.)
YES
Is a voltage (10V or more) generated between the connection terminals of the interface relay?
Replace the interface relay.
NO
Check the interface circuit.
Interface relay
Coil terminal
Contact terminal


LD301 : Blinks 8 times
Acceleration defective
YES
Is the power module normal?
NO
Replace the power module.
YES
Is the micro computer drive circuit PS–HIC normal?
NO
Replace defective parts.
Perform continuity check of the leads and pattern according to the P.W.B. diagram and circuit diagram.
LD301 : Blinks 7 times
Thermistor abnormal
Is the connector of the thermistor disconnected?
※ Be careful not to forget to re–connect after servicing.
YES
Connect the thermistor connector.
NO
Is the continuity of thermistor normal?
NO
Replace the thermistor.
YES
Is the thermistor circuit normal?
NO
Replace parts in the thermistor circuit.
Perform continuity check of the leads and pattern according to the P.W.B. diagram and circuit diagram.


LD301: Blinks 6 times
OH thermistor temperature rises.
Is the thermistor circuit normal?
NO
Replace parts in the thermistor circuit.
YES
LD301: Blinks 5 times
Overload lower limit cut
Leakage of refrigerant or compressor defective.
NO
Replace defective parts.
Check the continuity of replaced parts.
YES
Replace the control P.W.B..
LD301: Blinks 4 times
Switching failure
Is the power module normal?
NO
Replace the power module.
YES
LD301: Blinks 3 times
Abnormally low rotation speed
Are position detection circuit and drive circuit PS–HIC normal?
Replace defective parts.
Perform continuity check of the leads and pattern according to the P.W.B. diagram and circuit diagram.


LD301: Blinks 2 times
Peak current cut
Is the power module normal?
NO
Replace the power module.
YES
Is the drive circuit normal?
NO
Replace defective parts.
YES
• Are R804, CHOP–HIC and peripheral circuits normal?
• Is IP input signal of the micro computer normal? (Pin ㉒ of the micro computer is approx. 5V in the normal state.)
NO
Replace defective parts.
LD301: Blinks once.
Reset stop
Is the reset circuit normal? (Pin ⑰ of the micro computer is approx. 5V in the normal state.)
NO
Replace defective parts.
Operate the air conditioner again. Does it operate normally?
Perform a final check of operation.

Method for diagnosis of power module

MODEL	MP6501
Circuit diagram of the device (excepting the reflux diode.)	
Circuit diagram of the module	
Terminals symbol mark of the module ※See next page for measuring value using tester	POWER MODULE P.W.B. 

How to check Power module

Checking power module using tester

Set tester to resistance range (x100).

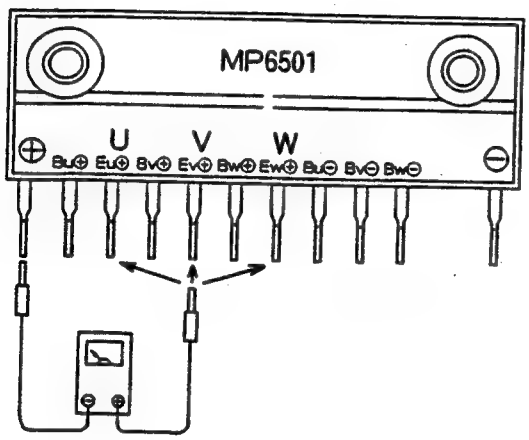
If indicator does not swing in the following conductivity check, the power module is normal.

(In case of digital tester, since built-in battery is set in reverse direction, ⊕ and ⊖ terminals are reversed.)

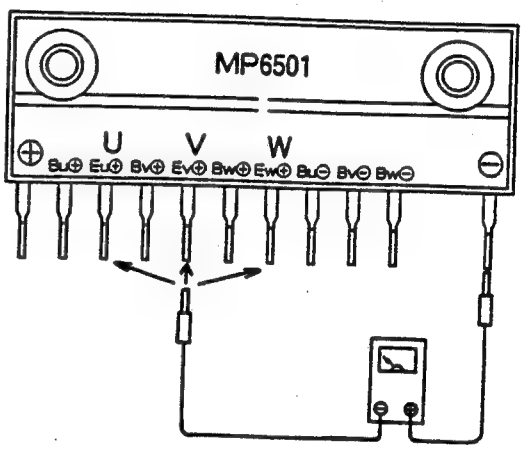
⚠ CAUTION

If inner circuit of power module is disconnected (open), the indicator of tester will not swing and this may assumed as normal. In this case, if indicator swings when ⊕ and ⊖ terminals are connected in reverse of diagram below, it is normal. Furthermore, compare how indicator swings at U, V and W phases. If indicator swings the same way at each point, it is normal.

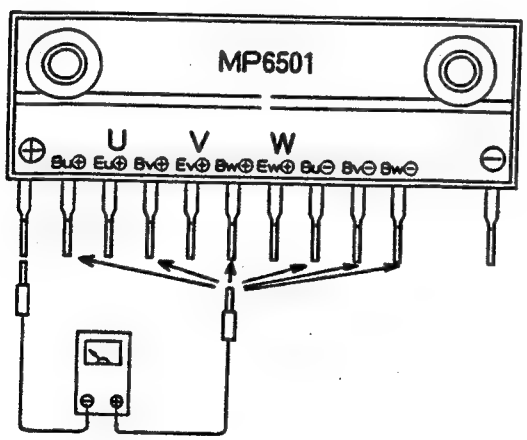
①



③



②



CHECKING THE REFRIGERATING CYCLE (JUDGING BETWEEN GAS LEAKAGE AND COMPRESSOR DEFECTIVE)

1. Troubleshooting procedure (No operation, No heating, No cooling)

Connect U,V,W phase leads to the power module again and operate the air conditioner.

Is the self–diagnosis lamp mode as shown on the right?

Lighting mode / Self–diagnosis lamp RAC–163CNHZ	Blinks 2 times	Blinks 3 times	Blinks 4 times	Blinks 5 times	Blinks 6 times	Blinks 8 times
LD301	▨	▨	▨	▨	▨	▨
LD302	□	□	□	□	□	□
Time until the lamp lights	2 – 3 seconds			Approx. 10 seconds	Within approx. 30 minutes	Approx. 10 seconds
Possible malfunctioning part	Compressor				Gas leakage	Compressor

▨ Blinking □ Lit

YES

Stop to operate and check the gas pressure in balancing mode.

Normal (0.39–0.98MPaG) (4–10kg/cm²G)

● Checking the power module

Gas leakage (Less than 0.39MPaG) (Less than 4kg/cm²G)

When the self–diagnosis lamp lights in the same condition as above.

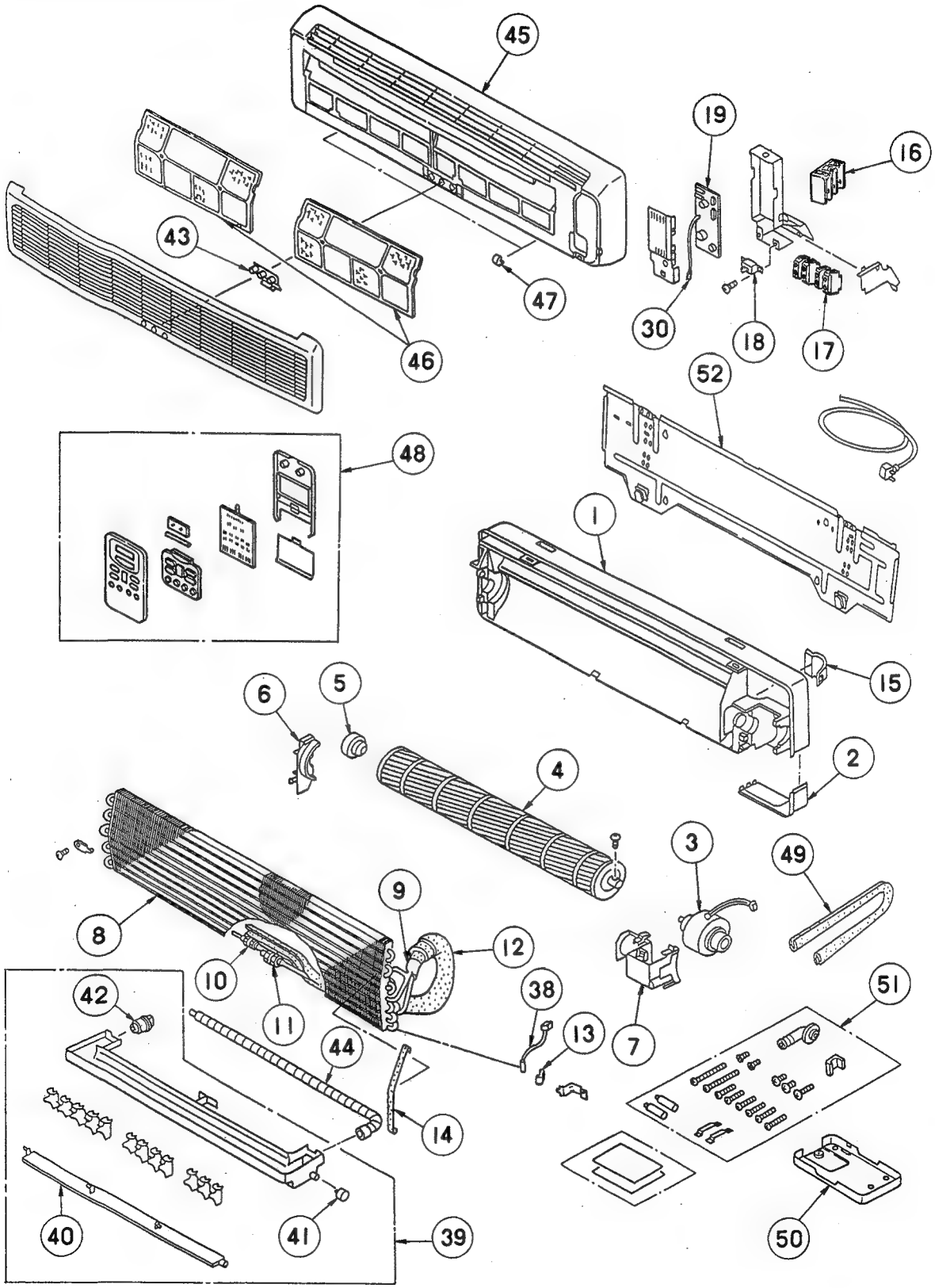
Gas leaks. Repair and seal refrigerant.

The compressor is defective. Replace it and seal refrigerant.
(If the compressor checker for an inverter type air conditioner is available, re–check using it.)

Perform a final check of operation.

PARTS LIST AND DIAGRAM

MODEL RAS-25CNH1

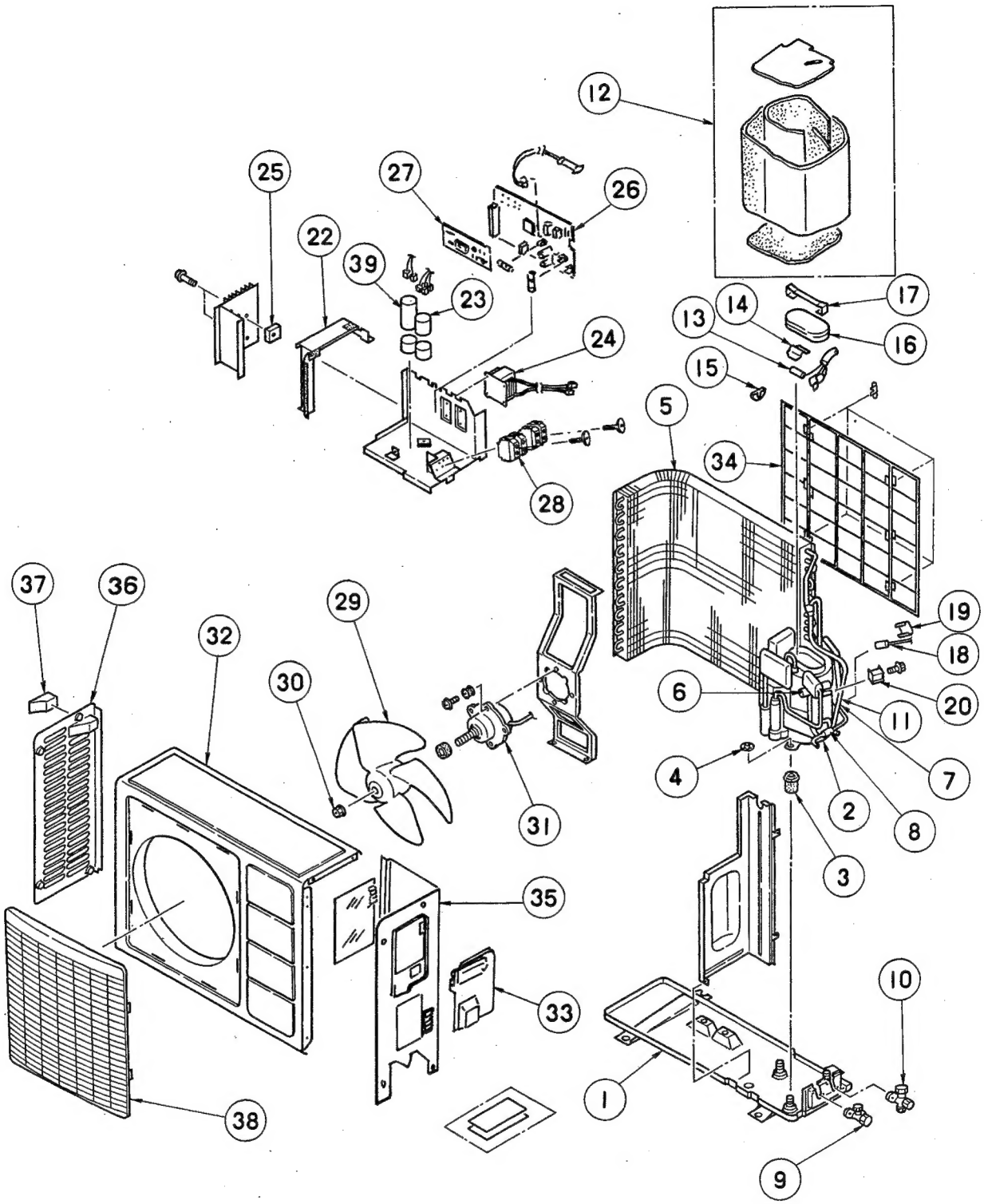


MODEL RAS-25CNH1

NO.	PARTS NO. RAS-25CNH1		Q'TY/ UNIT	PARTS NAME
1	RAS-258EX	001	1	CABINET
2	RAS-258EX	005	1	BOTTOM PLATE
3	RAS-289EX	003	1	FAN MOTOR 20W, 0.9kg
4	RAS-22EXR	003	1	TANGENTAL FLOW FAN
5	RAS-22EXR	002	1	FAN SUPPORT ASSEMBLY
6	RAS-258EX	009	1	FAN SUPPORT
7	RAS-258EX	010	1	FAN MOTOR SUPPORT
8	RAS-25CNH1	901	1	EVAPORATOR ASSEMBLY
9	RAS-258FX	802	1	PIPE SET
10	RAS-287AX	801	1	UNION (2)
11	RAS-287AX	802	1	UNION (3)
12	RAS-289GX1	002	1	COVER FOR PIPE
13	RAS-228FX	018	1	BULB SUPPORT
14	RAS-258EX	011	1	PIPE COVER
15	RAS-258EX	012	1	PIPE SUPPORT
16	RAS-2843CNH	901	1	TERMINAL BORD (3P)
17	RAC-2843CNH1	902	2	TERMINAL BOAD (2P)
18	RAS-288AX	011	1	SWITCH (POWER)
19	RAS-2843CNH	905	1	P.W.B.
20	RAC-163CNHZ	903	2	DRIVER-IC (UNL2003ANS)
21	RAC-25EX	009	1	IF MODULE
22	RAS-258EX	032	2	DIODE (LFB01)
23	RAS-258EX	033	1	DIODE (D1FL20U)
24	RAS-258EX	034	1	ZENERDIODE (RLZ24)
25	RAS-258EX	035	1	DIODE (G4DL6140)
26	RAS-259GX	014	1	ICP (0.5A) (TP) (FUSE)
27	R-927CXV	034	1	TRANSISTOR (2SC2462LC)
28	RAS-2236W	034	1	TRANSISTOR (2SA1121SCTL)

NO.	PARTS NO. RAS-25CNH1		Q'TY/ UNIT	PARTS NAME
29	RAS-258EX	038	1	REGURATOR (MC7805CT)
30	RAS-C22EX	002	1	THERMISTOR (ROOM)
31	RAS-258EX	042	1	BUZZER
32	RAS-258EX	043	1	COIL (RCH106-82K)
33	RAS-258EX	044	1	COIL (EY1-5)
34	RAC-206FD	006	1	COIL (L102)
35	RAS-258EX	045	1	CAPACITOR 470μF, 50V
36	RAS-258EX	046	1	CAPACITOR 220μF, 50V
37	RAS-258EX	047	1	TEMPORARY SWITCH
38	RAS-259FX	012	1	THERMISTOR (HEAT EXCHANGER)
39	RAS-258EX	013	1	DRAIN PAN ASSEMBLY
40	RAS-258EX	014	1	WIDE DEFLECTOR
41	RAS-228FX	019	1	AUTO SWEEP MOTOR
42	RAS-258CX	042	1	DRAIN CAP
43	RAS-258EX	015	1	P.W.B. (LED)
44	RAS-258CX	012	1	DRAIN HOSE
45	RAS-2843CNH	902	1	FRONT COVER ASSEMBLY
46	RAS-258EX	019	2	FILTER
47	RAS-258EX	021	2	CAP
48	RAS-2843CNH	903	1	REMOTE CONTROL ASSEMBLY
49	RAS-228FX	017	1	COVER PIPE
50	RAS-259FX	016	1	REMOTE CONTROL SUPPORT
51	RAS-2843CNH	904	1	SCREW ASSEMBLY
52	RAS-258EX	023	1	MOUNTING PLATE

MODEL RAC-25CNH1



MODEL RAC-25CNH1

NO.	PARTS NO. RAC-25CNH1		Q'TY/ UNIT	PARTS NAME
1	RAC-25FX	012	1	BASE
2	RAC-25FX	803	1	COMPRESSOR 9kg, 1200W
3	RAC-2226HV	805	3	COMPRESSOR RUBBER
4	KPNT1	001	3	PUSH NUT
5	RAC-25FX	801	1	CONDENSER
6	RAC-25FX	802	1	REVERSING VALVE
7	RAC-228DX	002	1	CHECK VALVE
8	RAC-25EX	018	1	STRAINER
9	RAC-22HEG	001	1	VALVE (2S)
10	RAC-22HEG	002	1	VALVE (2S)
11	KCAP3	006	1	CAPILLARY TUBE
12	RAC-25EX	004	1	SILENT COVER
13	RAC-25FX	014	1	THERMISTOR (OH)
14	RAC-25FX	001	1	THERMISTOR SUPPORT
15	RAP-166	004	1	THEMINAL BUSH
16	RA-226	015	1	O.L.R. COVER
17	RA-226	016	1	COVER SUPPORT
18	RAC-259FX	001	1	THERMISTOR (DEFROST)
19	RAC-25FX	004	1	BULB SUPPORT
20	RAC-25FX	005	1	COIL FOR REVERSING
21	RAC-22HSFX	002	1	COVER (ELECTRIC)
22	RAC-287GX	006	1	RAIN GUARD
23	RAC-60BHM3T	902	1	CAPACITOR (80μF, 420V)
24	RAC-2843CNH	901	1	REACTOR
25	RAC-40YDX2	008	2	DIODE STACK (GBPC2506)
26	RAC-25CNH1	901	1	P.W.B. (MAIN)
27	RAC-2843CNH	904	1	P.W.B. (FAN)

NO.	PARTS NO. RAC-25CNH1		Q'TY/ UNIT	PARTS NAME
28	RAC-2843CNH	902	2	TERMINAL BORD (2P)
29	RAC-328HX	002	1	PROPELLER FAN
30	RAC-25FX	027	1	NUT FOR PROPELLERFAN
31	RAC-28HX	002	1	FAN MOTOR 20W, 3kg
32	RAC-25CNH1	902	1	CABINET
33	RAC-25FX	008	1	ELECTRIC COVER
34	RAC-22FX	007	1	GVARD
35	RAC-25CNH1	903	1	SIDE PLATE (R)
36	RAC-25FX	010	1	SIDE PLATE (L)
37	RAC-25FX	011	1	HANDLE
38	RAC-25CNH1	904	1	GRILL
39	RAC-25CNH1	905	1	SMOOTHING CAPACITOR (1000μF, 420V)